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COMITÉ EJECUTIVO DEL FONDO MULTILATERAL
PARA LA APLICACIÓN DEL
PROTOCOLO DE MONTREAL
Cuadragésima Reunión
Montreal, 16 al 18 de julio de 2003

PROPUESTA DE PROYECTO: INDIA

Este documento consta de los comentarios y las recomendaciones de la Secretaría del Fondo sobre las siguientes propuestas de proyectos:

Disolventes

• Conversión de CFC-113 como disolvente de limpieza a tricloroetileno en Bharat Electronics Limited (BEL), Bangalore	ONUDI
• Plan de eliminación de tetracloruro de carbono para el sector de consumo (primer tramo)	Banco Mundial

HOJA DE EVALUACIÓN DEL PROYECTO
INDIA

SECTOR: Tetracloruro de carbono — Uso de SAO informado para el sector (2001): 9 320 toneladas PAO

Disolvente (CFC-113) — Uso de SAO informado para el sector (2001): 3,32 toneladas PAO

Umbrales de rentabilidad en el subsector: -

Títulos de los proyectos:

a) Conversión de CFC-113 como disolvente de limpieza a tricloroetileno en Bharat Electronics Limited (BEL), Bangalore
b) Plan de eliminación de tetracloruro de carbono para el sector de consumo (primer tramo)

Datos del proyecto	**Bharat Electronics Limited**	**Plan de eliminación de tetracloruro de carbono**
Consumo de la empresa (toneladas PAO)	16	6 662
Impacto del proyecto (toneladas PAO)	16	5 968
Duración del proyecto (meses)	24	84
Monto inicial solicitado ($EUA)	151 291	38 293 437
Costo final del proyecto ($EUA):		
Costo de capital adicional a)	200 300	38 293 437
Gastos imprevistos b)	20 030	
Costos de explotación adicionales c)	(69 039)	
Costo total del proyecto (a+b+c)	151 291	38 293 437
Propiedad local (%)	100%	100%
Componente de exportación (%)	0%	0%
Monto solicitado ($EUA)	151 291	18 705 909
Rentabilidad ($EUA/kg.)	9,45	6,42
¿La contraparte confirmó la financiación?	Sí	n/a
Organismo nacional de coordinación	Célula del Ozono, Ministerio de Medio Ambiente y Bosques	
Organismo de ejecución	ONUDI	Banco Mundial

Recomendaciones de la Secretaría		
Monto recomendado ($EUA) Impacto del proyecto (toneladas PAO) Rentabilidad ($EUA/kg) Gastos de apoyo del organismo de ejecución ($EUA)		
Costo total para el Fondo Multilateral ($EUA)		

DESCRIPCIÓN DE LOS PROYECTOS

Objetivos

1. En nombre del Gobierno de India, el Banco Mundial ha presentado a la Cuadragésima Reunión del Comité Ejecutivo un plan de eliminación de tetracloruro de carbono (el Plan). El Banco Mundial (proyectos de inversión en el sector de agentes de proceso), el PNUMA (estrategia del sector de disolventes) y la ONUDI (proyectos de inversión en los sectores de agentes de proceso y de disolventes) contribuyeron a la preparación del Plan, con el Banco Mundial como organismo director. El Plan se proporciona como anexo del presente documento.

2. La documentación que se envió a la Secretaría se ocupa del consumo de tetracloruro de carbono. Al momento de la preparación de este documento, el Banco Mundial seguía reuniendo material adicional sobre la producción.

3. El objetivo del Plan es apoyar al Gobierno de India a eliminar la producción y el consumo de tetracloruro de carbono, de acuerdo con el calendario de eliminación estipulado en el Protocolo de Montreal. Respecto del consumo de tetracloruro de carbono, éste necesita una reducción del 85% en el consumo básico de India de 11 505 toneladas PAO, correspondiente al periodo de 1998 a 2000 para el año 2005, y debe concluirse la eliminación para el año 2010.

4. Además de la eliminación de tetracloruro de carbono, el Plan dispone concluir la eliminación del consumo remanente que no se abordó en India y que es de 16 toneladas PAO de CFC-113. En el Plan, se ha incluido un proyecto de inversión, preparado por la ONUDI, para la empresa pertinente, pero con un costo adicional (Anexo 1.1 del Plan).

Consumo y costos adicionales

5. En el Capítulo I, Sección 2 (consumo y producción de tetracloruro de carbono en India), el Capítulo II (consumo y distribución de tetracloruro de carbono por sector) y el Capítulo IV (antecedentes del sector), se proporciona información sobre la producción, el consumo y el uso de tetracloruro de carbono como materia prima. La producción y el consumo en 2001 se toman como base para el Plan.

6. Para lograr los objetivos del Plan, India eliminará 795 toneladas PAO de tetracloruro de carbono mediante la conclusión de los proyectos ya aprobados y, además, 5 968 toneladas PAO de dicha sustancia a través de nuevas medidas a un costo propuesto de 38 293 000 $EUA, más los gastos de apoyo del organismo de 2 872 008 (es decir, 7,5%). El Plan tiene una rentabilidad general de 6,42 por kg.

7. La Tabla X.1 del Capítulo X del Plan ofrece una lista detallada del financiamiento total solicitado por categoría del subsector y por empresa (para compañías que no caen dentro de la clasificación de pequeñas y medianas empresas), incluida la eliminación correlativa. A continuación se presenta un resumen de esta tabla a escala subsectorial:

Actividad	Toneladas PAO	Rentabilidad $EUA/kg PAO	Fondos solicitados ($EUA)	Observaciones
Agentes de proceso				
Plan de caucho clorado	229	18,91	4 330 000	Revisado por la Secretaría antes de la 37ª Reunión del Comité Ejecutivo
Parafina clorada	199	5,73	1 140 843	Revisado por la Secretaría antes de la 39ª Reunión del Comité Ejecutivo
Aplicaciones farmacéuticas	601,81	9,50	5 719 052	
Aplicación agroquímica	213,59	2,11	450 524	
Sector de disolventes				
Disolventes químicos	867,35	5,31	4 608 982	
Limpieza de metales	2 207,33	8,82	19 464 661	
Equipo de ventilación para la industria textil	1 650	0,30	500 000	Con base en 500 $EUA por empresa
Asistencia técnica				
Asistencia técnica para agentes de proceso: industria farmacéutica			40 000	
Asistencia técnica para agentes de proceso: industria agroquímica			15 000	
Asistencia técnica para disolventes químicos: industria farmacéutica			200 000	
Gestión, sensibilización del público, capacitación, transferencia de tecnología			1 824 375	
Subtotal			2 079 375	5,4% del presupuesto total
Total	5 968	6,42	38 293 437	

8. A continuación, se ofrece el calendario de eliminación que se propuso e indica en la Tabla XI.1 I del Capítulo XI:

	Punto de partida (2001)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Objetivos de consumo (toneladas PAO)	6661,6	1697,3	1147,3	707,3	267,3	47,3	-
Objetivos de eliminación anual (toneladas PAO)	4964,3	550	440	440	220	47,3	-

Estrategia de ejecución

9. La estrategia de eliminación de India se presenta en el Capítulo V del Plan. India propone emplear proyectos de inversión y actividades ajenas a la inversión para reducir la demanda de tetracloruro de carbono, así como una combinación de medidas reglamentarias y en materia de políticas a fin de controlar la oferta y garantizar el logro de los límites de consumo.

10. La principal disminución en la demanda que se requiere para el 1° de enero de 2005 (unas 5000 toneladas PAO) debe conseguirse mediante

a) la terminación de todos los proyectos aprobados (en los sectores de agentes de proceso y de disolventes de limpieza); unas 800 toneladas PAO,

b) el logro de la eliminación a través de la conversión industrial en proyectos ya identificados/preparados en los sectores de agentes de proceso, disolventes químicos y disolventes de limpieza; unas 2600 toneladas PAO, (incluidos los proyectos descritos en los Anexos del 2 al 12 que se incluyen en el Plan)

c) la eliminación del consumo de una parte de las industrias restantes, identificadas sólo en parte, de las industrias de limpieza de metales y textil, a fin de lograr una reducción de unas 1800 toneladas PAO.

11. En el Capítulo III, se indican las medidas institucionales y en materia de políticas para garantizar la sustentabilidad de las reducciones propuestas en el Plan, a través de controles sobre la oferta y el uso de tetracloruro de carbono. La legislación se promulgó en 2000 y dispone cuotas de producción (ya en vigor para CFC), cuotas a la importación y controles para los usuarios finales. Se propone un sistema de supervisión y seguimiento para las importaciones.

12. Se apoyarán las actividades de inversión con asistencia técnica, incluso con actividades de intercambio de información y de sensibilización nacional y con el establecimiento de dependencias de servicios de tecnologías alternativas para disolventes, a fin de proporcionar capacitación en tecnologías alternativas.

Gestión del Plan

13. El Gobierno de India será responsable de poner en ejecución el Plan. Se establecerá una dependencia de gestión pequeña, la cual se ubicará junto con la dependencia de gestión de proyectos ya existente para el proyecto de clausura de CFC. En la Sección 5 del Capítulo IX, se resume la función de la dependencia. Ésta llevará a cabo actividades de promoción. Las empresas prepararán y presentarán propuestas de eliminación antes de finales de junio de 2004. Se asignarán las prioridades de financiación con base en la rentabilidad. La intermediaria financiera supervisará la ejecución de los proyectos de empresas individuales.

14. Se desarrollará un sistema de información para gestión con el fin de dar seguimiento al avance de los programas anuales de ejecución y a la eliminación general, incluidas las actividades de inversión y ajenas a ésta. En la Sección 8 del Capítulo X, se dan los detalles del funcionamiento del sistema en cuestión.

Financiación y desembolsos

15. El Gobierno de India busca la aprobación, en principio, del total de la solicitud, con desembolsos entre 2003 y 2009, de conformidad con el calendario de la Tabla XI.12. También, India está solicitando la aprobación, en esta reunión, del pago propuesto para 2003 de 18 705 909 $EUA más los gastos de apoyo del organismo de 1 402 943 $EUA. A partir del 2004, se buscan aprobaciones en la primera reunión del año, con base en el programa anual de ejecución para ese año. No se ha presentado el programa anual de ejecución para el tramo inicial de 2003. Los detalles de los arreglos que el Banco Mundial propuso para los desembolsos de los fondos aprobados para India se ofrecen en la Sección 4 del Capítulo IX.

Auditoría y supervisión

16. La dependencia de gestión hará la supervisión del progreso. El Banco Mundial llevará a cabo una verificación anual independiente de las actividades que se relacionan con la eliminación de tetracloruro de carbono en los sectores de consumo y producción, y supervisará la ejecución de los programas anuales. Asimismo, el Banco realizará esas verificaciones, de acuerdo con los requisitos del Comité Ejecutivo. Habrá una auditoría financiera anual de la intermediaria financiera, así como una auditoría de desempeño, de las cuales se encargará un organismo auditor independiente aceptable para el Banco.

Revisión técnica

17. No se ha proporcionado la revisión técnica.

Proyecto de acuerdo

18. Al momento de preparar este documento, no se contaba con un proyecto de acuerdo.

COMENTARIOS DE LA SECRETARÍA

Ámbito del Plan

19. El plan está destinado a abordar la producción y el consumo de tetracloruro de carbono, es decir, el sector completo de tetracloruro de carbono de India. Al momento de preparar este documento, no ha sido presentada información sobre el sector de producción de dicha sustancia.

20. El Plan va acompañado de una estrategia del PNUMA para el sector de disolventes que se incluye en el Plan como Anexo 1 y cuyo encabezado dice "proyecto de informe para revisión". Se toma nota que el PNUMA recibió 169 000 $EUA en la Trigésima quinta Reunión para la preparación de una estrategia para el sector de disolventes de India. En la parte principal del Plan, se incluyen varias medidas propuestas en el proyecto de estrategia del PNUMA. Sin embargo, las disposiciones financieras del Plan son diferentes de las del proyecto de estrategia del PNUMA. La Secretaría pidió la confirmación del Banco de que el proyecto de estrategia del PNUMA está incluido como documento de referencia y que la única solicitud de financiación que se está presentado en la Cuadragésima Reunión es la que se relaciona con el Plan mismo.

21. El proyecto de estrategia del PNUMA también se refiere a la eliminación de CFC-113 y ácido tricloroacético. En el Plan, se incluye la eliminación de CFC-113 bajo la forma de un proyecto para Bharat Electronics Limited (BEL). La Secretaría acordó con la ONUDI el costo adicional de este proyecto antes de la Trigésima séptima Reunión, pero no se presentó el proyecto porque en ese momento India no podría proporcionar la confirmación de que esta era su solicitud definitiva de financiación para la eliminación de CFC-113. Se ha buscado la confirmación del Banco Mundial de que, con la inclusión del proyecto de BEL, el Plan cubre la eliminación completa del consumo de CFC-113 en India, así como del de tetracloruro de carbono. Se observa que se está solicitando la financiación para el proyecto de BEL en forma adicional a los 41,2 millones $EUA del Plan. La Secretaría recomendó que, para mayor claridad, la propuesta al Comité Ejecutivo se presente como un plan sencillo, planteando un solo costo que cubra todas las actividades que se incluyen en el Plan, comprendida cualquier actividad que falte para abarcar otros sectores como el de CFC-113.

22. Respecto del ácido tricloroacético, en el proyecto de estrategia del PNUMA se reconoce que no hay más proyectos de inversión en India para ácido tricloroacético. Se expresa que el consumo remanente (año 2000) es de 3 176 toneladas métricas (317,6 toneladas PAO); sin embargo, los últimos datos del Artículo 7 que dio a conocer India (también para el año 2000), indican un consumo de 127,4 toneladas PAO. En el Plan, se señala que India pretende seguir el calendario de eliminación del Protocolo de Montreal para el ácido tricloroacético (la eliminación se termina hasta el 2015). Sin embargo, la Secretaría propuso al Banco Mundial que se considerara también el consumo remanente de ácido tricloroacético en el Plan ya que, según se especifica en el informe de la estrategia del PNUMA, el ácido tricloroacético se tomará en cuenta "mediante actividades similares a las que se discuten en la Sección 4.6", es decir, las medidas que deben ponerse en ejecución para lograr la eliminación de tetracloruro de carbono en las pequeñas empresas que no están identificadas. En cuanto a esto, se advierte que los planes de eliminación de CFC para Malasia y Tailandia se prepararon en forma semejante a fin de cubrir el uso remanente de otras SAO comunes.

Contenido de la propuesta

23. Las directrices de los planes sectoriales que se aprobaron en la Trigésima octava Reunión, y a las que hace referencia el párrafo 14 del Plan, exigen la preparación y presentación del plan en sí mismo, un plan anual de ejecución para el primer año y un proyecto de acuerdo entre el gobierno pertinente y el Comité Ejecutivo. Al momento de preparar este documento, no se habían proporcionado los últimos dos documentos. En el Capítulo IX, si bien se hace referencia a los programas anuales de ejecución, actualmente sólo se propone que éstos se proporcionen a partir del 2004. Debe elaborarse un plan anual como base para la aprobación inicial de la financiación. Podría presentarse como un plan para el saldo de 2003 y 2004.

24. El calendario de eliminación que se incluye en la Tabla XI.1 no ofrece ningún límite anual de consumo para tetracloruro de carbono antes de 2005. En otros planes sectoriales que están aprobados, los límites de consumo empiezan en el año en el que se celebró el acuerdo.

Responsabilidades de ejecución

25. El Capítulo IX se refiere sólo a la función del Banco Mundial en cuanto a la financiación, el desembolso y la ejecución del Plan. Se observa que el Plan contiene el proyecto de disolventes de BEL, para el cual se propuso financiación adicional, cuatro proyectos en el subsector de limpieza de metales y seis proyectos para aplicaciones nuevas que se presentan bajo “disolventes químicos”, pero que son semejantes a las aplicaciones que aún no se han clasificado como agentes de proceso. Todos estos proyectos han sido preparados por la ONUDI. Se solicitó al Banco Mundial que aclarara el grado en el que cualquier otro organismo debía participar en la ejecución y que reexaminara, por consiguiente, el Capítulo IX. La participación de otros organismos también necesitaría reflejarse en las tablas financieras del proyecto de acuerdo y en el proyecto de programa anual de ejecución, antes de someterla a la consideración del Comité Ejecutivo.

Consumo del subsector y admisibilidad

26. La Secretaría pidió aclaración sobre el consumo actual de varias empresas farmacéuticas del sector de agentes de proceso, en el entendimiento de que las compañías podían haber dejado de usar tetracloruro de carbono. Entre ellas figuran Kairav Chemicals, UNILAB y Dr Reddy’s Laboratory, con un consumo total especificado de 596 toneladas PAO. Se pidió al Banco Mundial que verificara esto y, de ser pertinente, enmendara el Plan al eliminar tanto el consumo como la financiación propuesta. También se pidió aclaración sobre el consumo de empresas del subsector agroquímico, incluida EID Parry (137 toneladas PAO), ya que es posible que algunas de ellas también hayan dejado de fabricar los productos químicos que requieren el uso de tetracloruro de carbono.

27. Sobre los el subsector de “disolventes químicos”, en el proyecto de informe del PNUMA (notas de la Tabla 12), se reconoce que los procesos que se emplean en las empresas concernidas no se incluyen actualmente en la lista de agentes de proceso del Anexo A de la Decisión X/14 de las Partes. El grupo de trabajo para agentes de proceso también mencionó usos semejantes en sus informes del 2002. Sin embargo, las Partes, en este momento, no han tomado ninguna decisión adicional de que se aumentaría la lista de aplicaciones de los agentes de proceso. Hasta que esto

suceda, puede necesitarse que dichos usos adicionales se sigan tratando como materia prima. Por lo tanto, parecería apropiado quitar del Plan el consumo propuesto (total de 867 toneladas PAO), junto con la financiación que se solicitó.

28. La Secretaría sugirió que India y el Banco Mundial podrían, no obstante, considerar el enfoque, aprobado en el plan de tetracloruro de carbono de China, de buscar el consenso de recurrir de nuevo al Comité Ejecutivo en caso de que las Partes añadieran, en un futuro, aplicaciones adicionales para los agentes de proceso. Es posible que esto requiriera someterse a la especificación de límites de consumo pertinentes. Al respecto, la Secretaría también pidió la confirmación sobre la situación del consumo de varias empresas que están en la lista de este sector, incluidas las enumeradas bajo el renglón de aplicaciones varias de la Tabla VII.3 y mencionadas en la Tabla X.1, algunas de las cuales pueden ser inadmisibles, en tanto que otras pueden ser comerciantes o formuladores en lugar de productores que consumen tetracloruro de carbono.

29. En cuanto al consumo en los subsectores de limpieza de metales y textil, la Secretaría llamó la atención sobre el consumo, no confirmado, de 1812 toneladas PAO que se atribuye a los pequeños usuarios del subsector de limpieza de metales y de 1650 toneladas PAO que se atribuye al subsector textil, para los cuales se propone una financiación total de más de 15 millones $EUA. El Plan indica que la fuente principal de información sobre el consumo total para usos en disolventes es la cifra colateral de 2001 de los productores, a saber unas 3 975 toneladas PAO, de las cuales se ha deducido la eliminación de 513 toneladas PAO que se espera de los proyectos aprobados para disolventes, dejando sin considerarse las 3462 toneladas PAO reclamadas. Parece ser que el consumo residual no considerado en la limpieza de metales se ha determinado, primordialmente, al restar del nivel de producción total del fabricante todos los usos y el consumo identificados. Esto no parece constituir una base suficientemente sólida para solicitar financiación. Se solicitó aclaración sobre esto, incluida más información sobre los resultados del estudio de distribuidores y de pequeñas empresas, así como los detalles de la información que se señala fue proporcionada por el PNUD.

30. En relación con las empresas de pequeña escala en el subsector de disolventes de limpieza y textil, la Secretaría también volvió sobre el informe de un estudio de pequeñas y medianas empresas, fechado en agosto de 1996, que financió el Fondo y que la National Small Industries Corporation realizó para el Gobierno de India. Si bien el ámbito de las actividades industriales desde esa fecha pudo haberse ampliado, tomando en consideración que la admisibilidad para financiación se relaciona con la capacidad industrial que existía en julio de 1995, los hallazgos son, a pesar de ello, importantes. El informe indica que en ese momento, “el sector de pequeña escala no era un gran consumidor de sustancias que agotan la capa del ozono” y que, en relación con los disolventes en particular, “se encontró que, durante el estudio, la pequeña escala usaba, en una medida no importante, sustancias que agotan la capa del ozono como disolventes”. Estos hallazgos hacen hincapié en la necesidad de proporcionar una corroboración del consumo a pequeña escala en el subsector de limpieza de metales y textil que se incluye en el Plan.

31. Pasando al sector del caucho clorado, se llegó a un acuerdo entre la Secretaría y el Banco Mundial sobre el costo adicional para terminar la eliminación en este subsector antes de la Trigésima octava Reunión. Los registros de la Secretaría revelan que el nivel acordado de

financiación fue 4 306 000 $EUA. Esencialmente, este nivel de financiación se postuló sobre una eliminación de 516 toneladas PAO de tetracloruro de carbono. A pesar del nivel actual de consumo en el subsector, si este nivel de costo adicional debe incluirse, la Secretaría aconsejó al Banco Mundial que el nivel correspondiente de eliminación, a saber, 516 toneladas PAO, tendría que ser considerado en esta financiación dentro del Plan general de tetracloruro de carbono.

32. Por último, el Plan no hace ninguna referencia al consumo que puede ser inadmisible para financiación porque, por ejemplo, la capacidad de producción pertinente se estableció después del 25 de julio de 1995 o a causa del nivel de las exportaciones a los países que no están al amparo del Artículo 5. En otros planes sectoriales, se ha establecido, por lo general, que se ha encontrado que no es admisible una proporción del consumo total (hasta 15% para el sector de disolventes de China).

33. En conjunto, parece que el consumo y la admisibilidad para la financiación es una de las principales cuestiones que requieren aclaración antes de que el Plan se considere para su aprobación.

Proyectos individuales

34. La Secretaría también revisó los cuatro proyectos individuales del subsector de limpieza de metales que preparó la ONUDI (Anexos del 2 al 5) e hizo sus comentarios al Banco Mundial y a la ONUDI. Es posible que esta revisión dé como resultado cambios en los costos adicionales. Estos cambios necesitarán incorporarse al Plan general. Por el momento, no se están revisando con detalle los siete proyectos que actualmente se encuentran listados bajo disolventes químicos, en vista de la conclusión de la Secretaría de que, ahora, los proyectos no son admisibles para financiación.

Financiación de programas ajenos a la inversión

35. El Capítulo VIII establece las actividades de asistencia técnica y de gestión que se asocian al Plan, incluidos los servicios de tecnologías alternativas para disolventes, que se usarán para apoyar a las pequeñas empresas en el proceso de eliminación. El Capítulo VIII señala que estas actividades se financiarán de la componente de gestión de 1,824 millones $EUA. Con esto en mente, el Banco Mundial ha solicitado aclaración sobre cuáles son las actividades que se propusieron para lograrse con la financiación de los 14,586 millones $EUA que se solicitan para los pequeños usuarios en el subsector de limpieza de metales con tetracloruro de carbono. Ésta es la mayor partida de financiación sencilla del plan y, sin embargo, hay poco detalle del gasto propuesto, a no ser de la parte final del párrafo 131, en la que se indica la porción de la financiación que se usará para proporcionar asistencia técnica.

Controles reglamentarios

36. En el Capítulo III, se indica que está implantada la legislación, mediante la cual pueden establecerse cuotas para la producción y las importaciones. Sin embargo, en el Plan, no se dan detalles del calendario de aplicación de los sistemas de cuotas y de los controles a la oferta que se proponen a fin de garantizar que no se excedan los límites de consumo anual. Es posible que dichos controles necesiten ser funcionales en 2004 a fin de asegurar el logro del alto grado de

disminución en el consumo de tetracloruro de carbono que se necesita en 2004 para lograr el 85% de reducción en 2005. La versión actual (17 de junio de 2000) de los reglamentos (reglamentación y control) para sustancias que agotan la capa del ozono de India no parece contener las disposiciones sobre las cuotas para tetracloruro de carbono, a no ser los niveles máximos de producción que estipulan las medidas de control del Protocolo de Montreal para dicha sustancia. Se ha invitado al Banco Mundial para que aclare el régimen reglamentario que se propuso.

Supervisión y auditoría

37. En la propuesta, se expone, a groso modo, la función del Banco Mundial. Sin embargo, se necesitará incluir, en el proyecto de acuerdo, el grado de detalle que exigen las directrices sobre la preparación de los planes sectoriales y que es consistente con aquellas que fueron ya aprobadas. Al respecto, será necesario especificar, entre otras cosas, a) cómo se verificarán los niveles de consumo general y las reducciones anuales de consumo y b) de qué forma se logrará que el gasto de la financiación en las subcategorías y actividades resumidas en los programas anuales de ejecución sea transparente para el Comité y se verifique posteriormente. Se ha pedido aclaración en cuanto a cuáles son las entidades (por ejemplo, la dependencia de gestión propuesta) que deben incluirse en la auditoría de desempeño.

38. Si bien el párrafo 187 se refiere al incumplimiento de los objetivos de eliminación, el proyecto de acuerdo también necesitará contener la cláusula usual que especifica las sanciones financieras de no cumplirse los objetivos.

Últimos datos del consumo

39. El 16 de junio de 2003, simultáneamente a la finalización de este documento, la Secretaría recibió del Gobierno de India cifras para el consumo de CFC-113, tetracloruro de carbono y ácido tricloroacético como parte del informe de Indica sobre la ejecución de su programa de país en 2001. El análisis inicial parece indicar que los datos del informe no son consistentes con las cifras que se presentaron en el Plan. Se está aclarando esta cuestión con el Banco Mundial.

40. Luego de evaluar la respuesta del Banco Mundial sobre los asuntos antes mencionados, la Secretaría comunicará la información adicional y cualquier recomendación, según corresponda, al Subcomité sobre Examen de Proyectos.

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PROJECT PROPOSAL

COUNTRY	India	**IMPLEMENTING AGENCY**	World Bank

PROJECT TITLE	CTC Phase-out Plan for the Consumption Sector for India
PROJECT IN CURRENT BUSINESS PLAN	Yes
SECTOR:	Several
SUB-SECTOR COVERED	Production, Process Agents, Solvent
ODS USE IN SECTOR (1992)	11,505 ODP tons – Consumption 11,553 ODP tons –- Production
ODS USE IN SECTOR (2001)	6,662 ODP tons (Consumption)
PROJECT IMPACT	6,662 ODP tons (Consumption)
PROJECT DURATION	7 years
PROJECT COSTS:	US$ 38,293,437
LOCAL OWNERSHIP	**EXPORT COMPONENT** 0%
REQUESTED GRANT	US$ 38,293,437
IA SUPPORT COST	US$ 2,872,008
TOTAL COST OF PROJECT TO MLF	US$ 41,165,445
COST EFFECTIVENESS	US$ 6.42/kg ODP
STATUS OF COUNTERPART FUNDING	Not applicable
PROJECT MONITORING MILESTONES INCLUDED	Yes
NATIONAL COORDINATING AGENCY	Ozone Cell, Ministry of Environment & Forests (MoEF)

PROJECT SUMMARY

This sector plan will assist India to phase out CTC consumption in the solvent, process agent, and other non-feedstock applications. The funding request targets the eligible consumption of 6,662 ODP tons of CTC. The proposed sector plan entails conversion activities, closure of CTC consuming enterprises, investment and non – investment activities to assist phase-out of CTC at small and tiny enterprises in the solvent sector. The project document contains detailed description of the action plan and phase-out strategy for the CTC consumption sector. For the production sector, a concept note is presented for the consideration of the Executive Committee.

The implementation of this sector plan will be supported by policy and regulatory actions to be initiated and enforced by the Government of India. An action plan indicating annualized phase-out targets and the draft agreement between the Government of India and the Executive Committee for this proposed sector plan are included.

Implementing Agencies involved in the preparation of this CTC phase-out plan include UNDP, UNEP, UNIDO and the World Bank.

IMPACT OF PROJECT ON COUNTRY'S MONTREAL PROTOCOL OBLIGATIONS: The CTC phase-out sector plan will enable the Government of India to reduce the consumption level of CTC to 85% of its baseline consumption and production levels by 1 January 2005, and to achieve complete phase-out, except for CTC consumption for feedstock applications, by 1 January 2010.

Prepared by: Bilal H. Rahill, Ruma Tavorath and Viraj Vithoontien Date: April 2003

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CHAPTER I INTRODUCTION

1. Background

1. The Government of India ratified the Montreal Protocol (MP) on Substances that Deplete the Ozone Layer on September 17, 1992. India has been classified as a country operating under Article 5, paragraph 1 of the Protocol. The Ministry of Environment and Forests (MoEF) has been empowered by the Government of India to have overall responsibility for implementation of Montreal Protocol related activities in India. The MoEF has established an Ozone Cell with operational responsibility for implementation of the Protocol-related activities in India.

2. The Country Program for the Phase-out of Ozone Depleting Substances was submitted for the Executive Committee's consideration in 1993. The 1993 Country Program reported net CTC production and consumption of 1,958 ODP tons and 5,097 ODP tons in 1992, respectively. These figures do not include production and consumption for feedstock applications.

Table I.1 India CTC Consumption and Production Data as per Article 7 of the Montreal Protocol (ODP tons)

	1989	1992	1993	1994	1995	1996	1997	1998	1999	2000
Consumption	4,758	5,097	10,600	8,790	3,112	8,776	7,876	6,270	16,099	12,147
Production	4,758	1,958	(1,036)	8,433	(21,788)	(19,787)	7,876	6,614	15,897	12,147

3. As a Party to the Montreal Protocol, India is required to submit its annual production and consumption data for all controlled substances under the Montreal Protocol to the Ozone Secretariat of UNEP in Nairobi (Article 7 of the Montreal Protocol). The data reported by the Ozone Cell on behalf of the Government of India, as required by Article 7 of the Protocol, particularly the data for 1998 – 2000, was used for establishing the baseline levels for production and consumption of CTC during the compliance period. The official baseline consumption and production levels for India are 11,505 ODP tons and 11,553 ODP tons, respectively.

Table I.2: Average CTC Consumption and Production (per Article 7) During 1998 – 2000

Reported Data (Article 7)	**1998**	**1999**	**2000**	**Baseline**
Consumption (ODP tons)	6,270	16,099	12,147	11,505
Production (ODP tons)	6,614	15,897	12,147	11,553

4. CTC is an ozone depleting substance listed in Annex B, Group II, of the Montreal Protocol. The phase-out schedule of this chemical, that is applicable to Article 5 countries, is as follow:

- Consumption
  - 85% reduction of CTC consumption by 1 January 2005;

- 100% reduction of CTC consumption by 1 January 2010;

- Production
  - 85% reduction of CTC production by 1 January 2005[1];
  - 100% reduction of CTC production by 1 January 2010[2].

5. The latest CTC consumption and production levels (2001)[3] are 42,639 ODP tons and 18,105 ODP tons, respectively. To be in compliance with the Montreal Protocol, India must reduce its consumption and production levels for non-feedstock applications to 1,725.75 ODP tons and 1,733 ODP tons, by 1 January 2005.

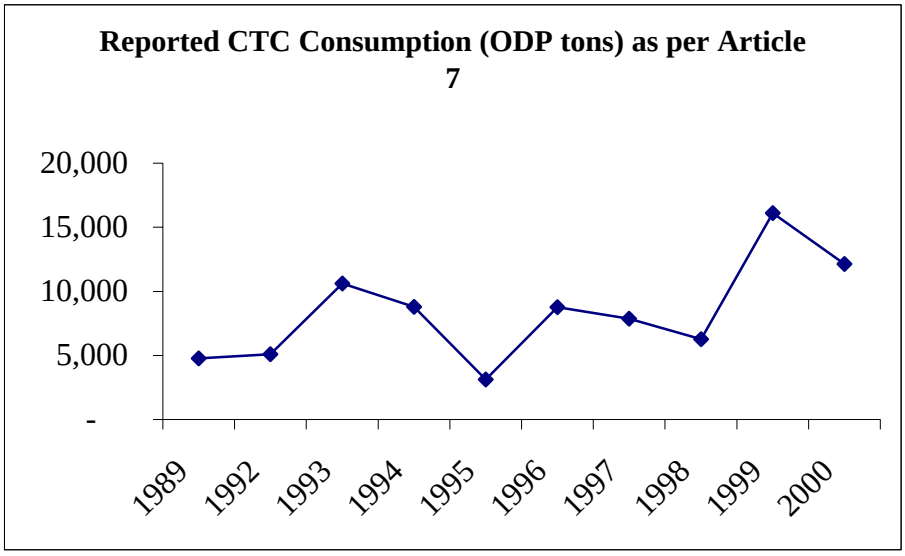


Figure I.1 CTC consumption for non-feedstock applications reported by the Government of India as per Article 7 of the Montreal Protocol

[1] Allowance for production to meet the basic domestic needs of Article 5 parties: 10 percent of base level production.
[2] With possible essential use exemptions.
[3] Production and consumption figures include demand for feedstock and non-feedstock applications.

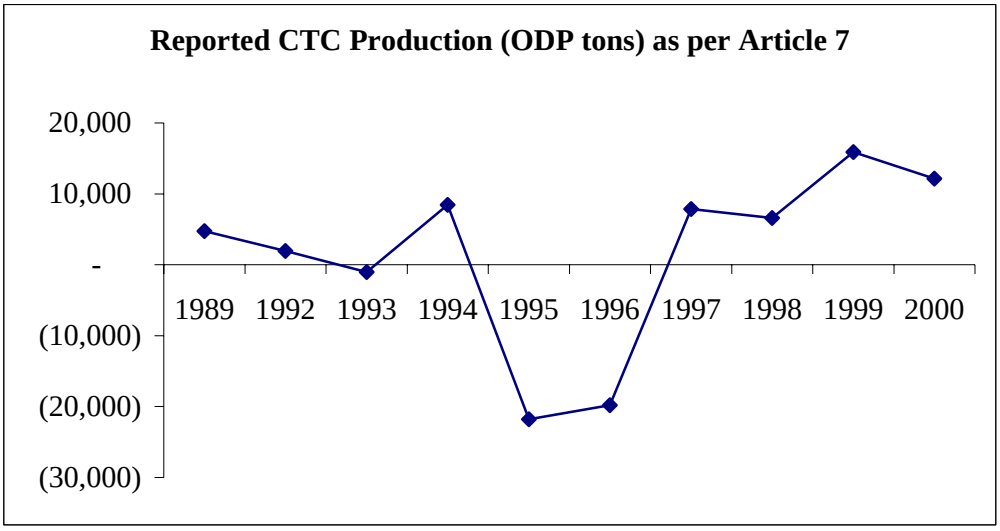


Figure I.2 CTC production for non-feedstock applications reported by the Government of India as per Article 7 of the Montreal Protocol

6. The definition of production as per Article 1 of the Montreal Protocol is the total production level minus the total tonnage destroyed by technologies approved by the Parties and minus the total tonnage consumed as feedstock. Based on this definition, the reported figures could vary significantly depending on the level of CTC imported for feedstock applications. However, for the purpose of this study and for the purpose of establishing a production and consumption baseline, the reported figures for 1998 to 2000 are used for the development of this CTC phase-out plan.

2. CTC Consumption and Production in India

7. The demand for CTC in India for feedstock and non-feedstock applications is more than 40,200 MT per year (average demand during the period from 1998 to 2000). CTC is used as a feedstock as well as a process agent and solvent. The demand is met by both the local production of CTC and imported CTC. The average production level of CTC during 1998 – 2000 is about 19,000 MT, which is supplemented by additional imports of 21,300 MT per year (as per survey results).

8. In average, about 33,800 MT of the total supply of 40,200 MT was used in the applications considered as feedstock[4] by the Montreal Protocol. Major feedstock applications in India include the use of CTC for the production of CFCs, and the use of CTC for the production of DV acid chloride, an intermediate material for the production of cypermethrin and other synthetic pytheroids. The use of CTC for the production of DV acid chloride will be considered as a feedstock application until Parties of the Montreal Protocol decide otherwise. A small amount of CTC was exported in 1998 and 1999. However, export of CTC has stopped since 2000. In addition, small consumption of CTC as laboratory reagents was also identified. The average feedstock use for the

[4] Feedstock is defined as the use of controlled substances as raw materials for manufacturing of other chemicals.

production of CFC during the period from 1998 to 2000 is 27,000 MT, and 6,800 for the production of DV acid chloride[5].

9. The remaining amount of CTC (40,200 MT less 33,800 MT used as feedstock, laboratory reagents and export) is consumed by the process agents industry and the solvent sector in India. The average consumption of CTC in the process agents industry, between 1998 and 2000, is approximately 2,600 MT. A balance of 3,800 MT of CTC is believed to be used in the solvent sector.

10. In 2001, the total quantity of CTC locally produced was 16,459 MT. This quantity was supplemented by imports of another 24,661 MT. On the demand side, the total CTC requirement for feedstock applications was 32,649 MT. About 6,056 MT was consumed in the applications considered as consumption by the Montreal Protocol. There were about 2,415 MT of CTC unaccounted for by the survey. This could represent the level of inventory maintained by distributors and dealers. About 1,740 MT of the total identifiable consumption of 6,056 MT was for meeting the demand in the process agents industry. The total consumption of CTC in the solvent sector in 2001 was 4,314 MT.

Table I.3: Estimated CTC Consumption and Production in 2001

	MT	Total MT
Supply		41,120
Domestic Production	16,459	
Import	24,661	
Demand		38,705
Feedstock Applications	32,649	
Consumption*	6,056	

*An estimate based on identifiable consumption

3. Development of the CTC Phase-out Plan for India

11. The CTC Phase-out Plan is developed by the World Bank, UNEP and UNIDO under the leadership of the MoEF. The World Bank was originally assigned by MoEF to take the lead in the development of phase-out plans for the process agents sector and the CTC production sector.

12. The process agents sector comprises of three sub-sectors: (i) pesticide industry; (ii) pharmaceutical industry; and (iii) chlorinated rubber industry. As UNIDO has extensive experience in the pharmaceutical sub-sector in India, the Bank is, therefore, working closely with UNIDO to develop a phase-out plan for the pharmaceutical industry.

[5] DV acid chloride is an intermediate chemical for production of cypermethrin and other synthetic pytheroids.

13. For the solvent sector, the Government of India assigned UNEP to prepare a phase-out strategy for this sector. Initially, the process agent sector plan, CTC production closure plan, and the solvent sector plan, were supposed to be submitted as three stand-alone sector plans. However, the Government of India recently decided that these three plans should be submitted as a single strategy for India to meet its obligations set forth in paragraph 8 bis (b) of Article 5 and the related Article 2D.

14. The development of the CTC Phase-out Plan was undertaken under the guidance of MoEF and in close consultation with the relevant industrial sectors in India. The CTC Phase-out Plan has been prepared in accordance with the Guidelines for the Preparation of Sector Plan and National Plan as adopted by the Executive Committee at its 38th Meeting in 2002.

4. Objective of the CTC Phase-out Plan

15. The CTC Phase-out Plan aims to address the need of the Government of India to reduce its CTC production and consumption levels to 15% of its baseline level (average level between 1998 and 2000) by 1 January 2005, and complete phase-out by 1 January 2010. However, due to complexity of the alternate technology, production of co-products, and economic implications of the CTC production phase-out that may have to the industry consuming CTC and/or co-products, the formulation of a comprehensive strategy for the production sector will require more time. To allow Government of India to initiate discussions with the Executive Committee about the strategy, in a holistic manner, the CTC production sector phase-out plan is being initiated on the basis of a background note, which is included as Annex I of this document. Preparation of a CTC production phase-out plan on the basis of this background note is to be initiated soon.

16. The CTC Phase-out Plan addresses CTC phase-out in the applications considered as consumption by the Montreal Protocol. With financial support of the Multilateral Fund, implementation of this plan will allow the Government of India and its industry to reduce its identifiable or verifiable consumption of CTC from 6,662 ODP tons in 2001 to 1,725.75 ODP tons by 1 January 2005, and zero by 1 January 2010.

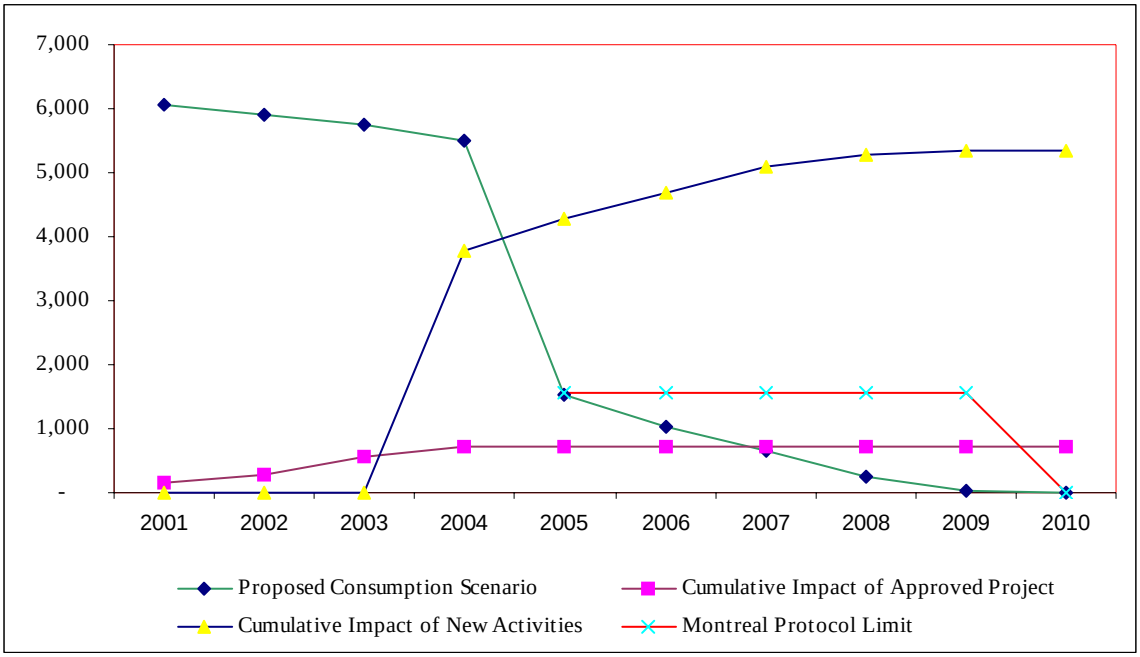
17. To achieve the required consumption reduction, the CTC phase-out plan is proposing a series of activities to be undertaken from 2003 onwards. These include timely completion of the on-going activities already approved by the Multilateral Fund, implementation of new investment and non-investment activities with priority in the process agent sector and those new enterprises already identified during the preparation of this CTC phase-out plan.

18. The proposed CTC phase-out plan also includes initiation of CTC phase-out activities in the metal cleaning and textile industry. A number of enterprises in the metal cleaning, and textile applications have already been identified during the preparation of this plan. However, there are a large number of small and medium scale enterprises in the metal cleaning, and textile sub-sectors, that have to be further identified during the implementation of this plan. Therefore, funding resources to support awareness

campaign and other relevant technical assistance components to support CTC phase-out in the small and medium scale enterprises are also included in this plan.

19. The CTC phase-out scenario being proposed under this plan is shown below.

Figure II.3: Proposed CTC Consumption Phase-out Scenario (MT)



5. Government Strategy for Development of a CTC Phase-out Plan

20. For India to meet its 85% production and consumption reduction by 2005, significant reduction of CTC consumption and production must be achieved within less than two years. For the production sector, there are five CTC producers of which, two have already ceased their operations. However, for the consumption sector, a large number of small users are involved.

21. Given the large number of CTC users to be covered under this plan and a limited time available for implementation of this plan, a project-by-project approach can no longer be employed. The Government of India, therefore, adopts the following strategies for the development of a CTC phase-out plan:

- Announced the Government's policy to phase out the overall consumption and production of CTC by 85% of its baseline consumption and production levels by 1 January 2005, and complete phase-out for both consumption and production by 1 January 2010;
- Invited all residual CTC users and producers to apply for financial and technical assistance from the Government. The Government of India invited these enterprises to submit their CTC consumption/production data and requests for

technical assistance to the Ozone Cell and/or implementing agencies (UNEP, UNDP, UNIDO and the World Bank) of the Multilateral Fund;

- Requested implementing agencies to assist enterprises that express their interest to seek funding from the Multilateral Fund to develop project proposals in line with the guidelines of the Multilateral Fund;
- For those who did not come forward for assistance during the development of this CTC phase-out plan, the Government of India, with the assistance of implementing agencies, determines the funding level for phasing out CTC in various known applications on the basis of the average cost-effectiveness values of similar projects that have been approved previously for India by the Executive Committee;
- Once the plan and its associated funding request are approved, the Government of India will make an offer to the industry on the basis of the funding level determined during the development of this plan to eligible enterprises. In case, the funding level provided by the Multilateral Fund is not sufficient to cover the full cost of conversion, the balance will have to be covered by enterprises' own funds. In case there are savings, additional funds could be provided to enterprises.

6. Methodologies for Determining Phase-out Costs

22. The proposed CTC phase-out plan entails new investment and non-investment activities. New investment activities could be categorized into three groups:

- Investment activities that have already been approved in principle by the Executive Committee;
- Investment activities for enterprises that have already had detailed conversion proposals developed;
- Investment activities for enterprises that conversion plans or proposals would have to be prepared during the implementation of this plan.

23. For investment activities whose project proposals have already been approved in principle by the Executive Committee, the funding levels already accepted by the Executive Committee are used in this plan. For investment activities that detailed project proposals have already been developed, detailed incremental costs for conversion activities, in line with the prevailing Executive Committee guidelines, are provided. Project proposals of these activities are attached as attachments to this CTC phase-out plan. For those investment activities that conversion plans could not be developed during the development of this plan, an average cost-effectiveness value of similar activities previously approved for India by the Executive Committee is employed as a basis for determination of the eligible costs of conversion.

24. For non-investment activities, the funding request is determined on the basis of an estimated cost for each proposed activity.

7. Total Funding Request for Implementation of the CTC Phase-out Plan

25. Based on the cost calculation methodologies described in the previous section, the final funding request from the Multilateral Fund is determined. The proposed funding request of US$ 38,293,437 will be used for phasing out 5,968 ODP tons of CTC. This CTC phase-out plan along with the projects that were previously approved by the Multilateral Fund will enable the Government of India to phase out all residual CTC consumption of 6,662 ODP tons. Based on the phase-out strategy proposed in Chapter V, India will be able to meet the 85% consumption reduction target in 2005 and complete phase-out in 2010.

26. The funding request determined by the above methodologies results in an overall cost-effectiveness of US$6.42 /kg ODP for the CTC consumption component of the proposed CTC phase-out plan.

CHAPTER II CTC CONSUMPTION AND DISTRIBUTION BY SECTOR

1. Source of CTC Supply

27. Supply of CTC in India comes from both domestic production and import. Currently, there are three manufacturers of CTC in India. These are:

- Gujarat Alkalies and Chemicals Limited (GACL);
- Chemplast Sanmar Limited; and
- SRF Limited.

28. There were two additional producers of CTC. However, both of them have already ceased their production. Shiram Rayons Limited also produced CTC but has stopped its production since 1999 while NRC Limited stopped its production in 1994.

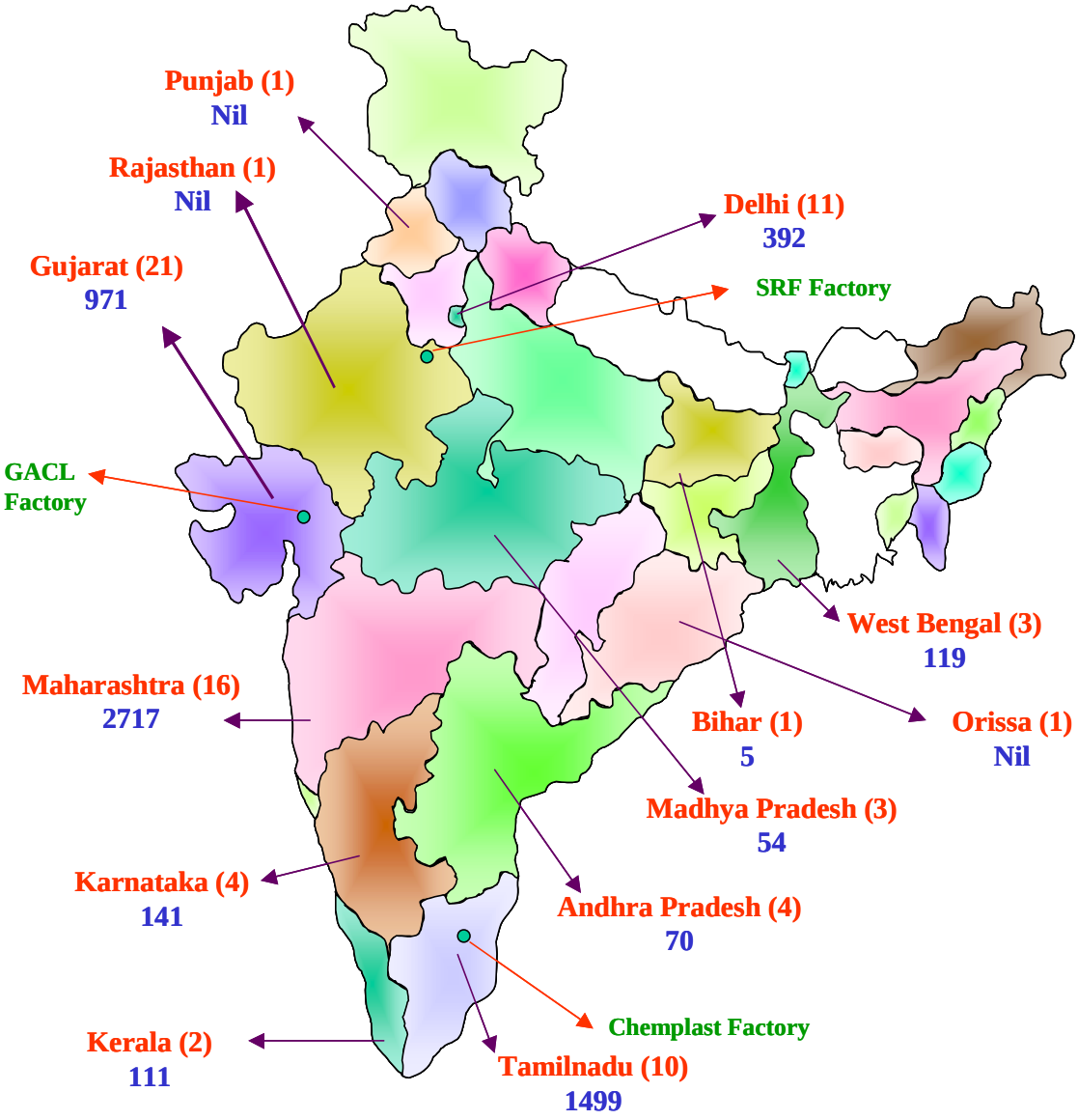
29. To manufacture CTC, GACL employs the process of chlorination of methane while Chemplast and SRF use the process of chlorination of methanol. Both processes generate methylene chloride, one of the CFC alternatives in the foam sector, and chloroform, feedstock for the production of HCFC-22, as co-products.

30. As pointed out in the earlier chapter, the domestic supply of CTC accounts for only about 50% of the total demand. The remaining demand is met through imports. CFC producers, DV acid chloride producers and some large process agent manufacturers are the only importers of CTC under the prevailing licensing regulation. Decisions to import depend mainly on economics.

31. While major CTC users like CFC, DV acid chloride producers, and process agent manufacturers either import or buy directly from the CTC manufacturers, other consumers, especially small users, particularly those in the solvent sector, have access to CTC through distributors and retailers only.

32. Based on the information provided by CTC manufacturers, there are about 78 distributors in 13 states in India (Table II.1). The list of all distributors is included in Annex II. Geographical distribution of reported sales of CTC in 2001 is shown in Figure II.1. In addition to distributors, there are more than 400 retailers/traders that are active in selling CTC to end-users across India. Based on the information provided by the distributors, consumption of CTC appears to be concentrated in a few states in India. This finding is critically important to the design of the implementation plan for this sector plan, which is described in the later part of this document.

Figure II.1: Geographic Distribution of Reported Sales of CTC in India in 2001[6]



[6] Figures in bracket indicate State-wise distributors/dealers. Figures in blue represent quantities of CTC sold by distributors located in the corresponding States in 2001.

Table II.1: Geographic Distribution of CTC in India

State/City	CTC Manufacturer	No. of Distributors	Reported Sales in 2001 (MT)
Delhi	SRF Limited	11	392
Punjab		1	
Rajasthan		1	
Gujarat	GACL	21	971
Maharashtra		16	2,717
Karnataka		4	141
Kerala		2	111
Tamilnadu	Chemplast	10	1,499
Andhra Pradesh		4	70
Madhya Pradesh		3	54
Bihar		1	5
Orissa		1	
West Bengal		3	119
Total	3	78	

2. CTC Consumption in India

33. There are five major applications of CTC in India. These are:

- Feedstock applications;
- Process agents;
- Solvent;
- Laboratory reagents; and
- Export.

34. Feedstock applications mainly are the use of CTC in the production of CFCs, DV acid chloride, and intermediate chemicals for the production of synthetic pytheroid such as cypermethrin. However, the Montreal Protocol does not consider the use of CTC as feedstock as consumption. For the process agent sector, CTC is being used in the agro-chemical industry, chlorinated rubber industry, pharmaceutical industry, and others. CTC used as a process agent is counted against the national consumption only when such applications are listed in Table A of Decision X/14 adopted by the Parties of the Montreal Protocol. Table A of Decision X/14 is included as Annex III.

35. Major solvent applications of CTC are in textile and metal cleaning applications. CTC is used for metal cleaning applications in steel industry, newsprint and printing industry, engineering components manufacturing industry, machine cleaning, and cleaning of refrigeration equipment in the refrigeration sector. Small uses of CTC as

laboratory agents were also identified. In addition, a small quantity was also exported. However, there has been no export of CTC since 2000.

36. While the total supply (production plus import) of CTC was 41,120 MT in 2001, the survey conducted during the preparation of this plan could account for the total consumption of 38,705 MT. A small difference of 2,415 MT between the two sets of data probably arises from the fact that normally there is a certain level of inventory maintained by importers, distributors, traders, and some amounts of imported CTC that were not reported during the year as these amounts were withheld at the ports for customs clearance. The diagram demonstrating the breakdown and the flow of CTC from the supply side to the demand side is shown in Figure II.2.

Table II.2: Supply and Demand of CTC in India in 2001[7]

CTC Supply and Demand	MT	Total (MT)
Supply		41,120
CTC Production	16,459	
CTC Import	24,661	
Demand		38,705 *
Feedstock Applications		
CFC Production	24,298	
DV Acid Chloride	8,311	
Laboratory Reagents	40	
Sub-Total	32,649	
Process Agents		
Table A of Decision X/14		
Chorinated Rubber	277	
Endosulphan	264	
Dicofol	69	
Chlorinated Paraffin 70% Solid Grade	181	
Ibuprofen	169	
Bromohexine Hydrochloride	213	
Phenyl Glycine	14	
Omeprazol	-	
Diclofenac Sodium	510	
Chlorophenesin	40	
Isosorbid Mononitrate	5	
Sub-Total	1,742	
Solvent		

[7] Best estimates provided by the industry.

Textile Applications	1,500	
Metal Cleaning Applications	2,114	
Chemical Solvents		
Dexamethasone Phosaphate, Betamethasone Phos..	50	
Candesartan, Ceftazidime, Indeloxacine, Remoxirp..	118	
Carbimazole	7	
Para Nitro Benzil Bromide	94	
Benzophenone	41	
Bromobenzine	-	
Ethyl 4- Chloro Aceto Acetate	10	
Chloropyriphos	-	
Others	380	
Sub-Total	4,314	

*Discrepancy may arise from the mismatch between fiscal year data and calendar year data, and the CTC inventory held at the ports.

37. The eligible quantity of CTC to be phased out with financial and technical assistance from the Multilateral Fund is about 6,056 MT. This amount includes CTC to be phased out from CTC phase-out projects already approved by the Multilateral Fund.

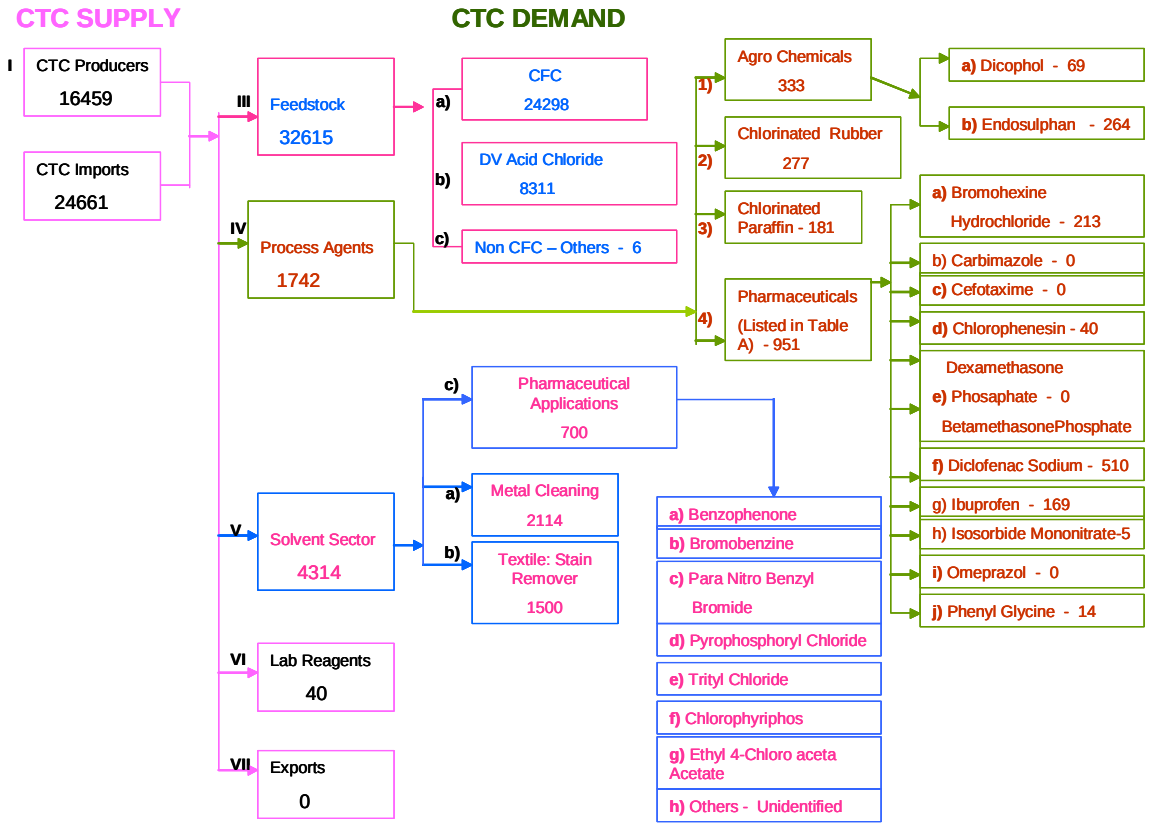


Figure II.2: Flow Diagram of CTC Supply and Demand in 2001 (MT)

CHAPTER III POLICY FRAMEWORK

1. Institution Framework

38. Ministry of Environment and Forests (MoEF): The Government of India has entrusted the Ministry of Environment and Forests as an implementing agency to undertake activities and measures to eliminate the use of ozone depleting substances and to ensure India's full compliance with its obligations to the Montreal Protocol. MoEF has established a National Unit, the Ozone Cell, to coordinate and facilitate ODS phase-out activities in India. This proposed CTC phase-out plan was developed by MoEF through the Ozone Cell. Similarly, MoEF will be the implementing agency and will be responsible for implementation, monitoring and supervision of this CTC phase-out plan. MoEF will discharge its functions through the Ozone Cell. In addition, implementation of this proposed CTC phase-out plan, like any other ODS activities, will be supported by the following bodies:

- Empowered Steering Committee: An Empowered Steering Committee has been constituted under the chairmanship of the Secretary (Environment and Forests), for overall supervision and to take all policy decisions for implementation of the Protocol and Country Program in India;
- Technology and Finance Standing Committee (TFSC): TFSC has been established to provide policy guidance, direction and oversight to the Montreal Protocol program. TFSC reviews and approves all project activities to be undertaken with funding from the Multilateral Fund; it consists of representatives from relevant line Departments/Ministries, national research institutions and industry associations;
- A Society has been registered with members from Ministry of Environment and Forests, Ozone Cell, Ministry of Chemicals, Ministry of Industry, other associated line ministries and the industry to facilitate the set-up of Project Management Units (PMUs) to implement and monitor individual sectoral projects under the Montreal Protocol. The main responsibilities of the PMUs are given below:
    - Implementing and reviewing ODS phase-out plan;
    - Assisting the Government of India in implementing ODS phase-out policies including the ODS production quota system;
    - Conducting training/workshops/seminars/public awareness for various stakeholders in the phase-out programs.

  The President of the Society is the Additional Secretary of MoEF, and the Secretary of the Society is the Director of the Ozone Cell. The management structure of the Society ensures that all the sub-units that are implementing project activities, are reporting to the Ozone Cell.

39. Project Management Unit (PMU) for the CFC production closure plan: The Multilateral Fund approved the CFC production closure plan for gradual phase-out of CFC production in India at the 29th Meeting of the Executive Committee. A PMU was established under MoEF for providing technical assistance to the project. This unit also forms a sub-part of the Society discussed previously.

40. Line Ministries and Departments: Several line ministries and authorities (Department of Fertilizer and Chemicals, DGFT, Customs) take part in the implementation of the overall ODS phase-out plan of India. Responsibilities of these agencies are as follow:

- Participation in the formulation and review of the overall ODS phase-out program;
- Issuing export licenses;
- Monitoring production as reflected in excise returns, etc.;
- Monitoring exports to verify compliance with the CFC production closure annual programs; and
- Coordination with PMUs to address new implementation issues encountered during implementation of various ODS phase-out activities.

41. In addition to above, the Ozone Cell periodically interacts with the Central and State Pollution Control Board(s), industry associations, technical institutions and selected industry representatives, when developing new measures or decisions pertaining to the execution of the Montreal Protocol program in India.

2. Relevant Regulations

42. India has put in place a number of policy instruments to facilitate cost-effective and effective phase-out of ozone depleting substances in the industry sector. Policy instruments include command-and-control measures as well as market-based instruments.

43. In accordance with the National Strategy for ODS phase-out, MoEF has notified rules covering production, sales, consumption, export and import of ODS. These regulatory measures are part of the ODS (Regulation and Control) Rules 2000, which have been published in the Gazette of India on July 19, 2000. The key aspects pertaining to these rules in connection with CTC and other ODS substances used in the solvent sector are summarized below.

44. Production of CFC-11, CFC-12, and CFC-113 is controlled through a production quota system. Production quantities for CFCs will gradually decrease to zero by 2010. Implementation of this policy falls within the scope of the CFC production closure plan. As no imports of CFCs are currently allowed, consumption of CFCs is equally affected by these regulations.

45. Based on the ODS Rules 2000, CTC production for non-feedstock applications will be completely eliminated by 2010. With regard to 1,1,1 – trichloroethane (TCA), India has stopped production of this chemical for several years. No establishment of new TCA production facilities will be allowed. Control measures related to imports of TCA are being implemented as per the phase-out schedule of the Montreal Protocol.

Table III.1 Phase-out Schedules

Substance	Maximum Allowable Annual Production as a Percentage of Baseline Level*	Maximum Allowable Annual Consumption as a Percentage of Baseline Level	Effective Date
Group I - includes CFC-11, CFC-12, and CFC-113	50%	50%	1 January 2005
	15%	15%	1 January 2007
	0%	0%	1 January 2010
Group IV - includes CTC	25%	15%	1 January 2005
	0%	0%	1 January 2010
Group V - includes 1,1,1-TCA	80%	70%	1 January 2005
	40%	30%	1 January 2010
	0%	0%	1 January 2015

*Higher production level is allowed for meeting basic domestic needs of other Article 5 countries.

45. *Consumption:* The ODS Rules entail further regulations controlling consumption of ODS at the end-user level. These regulations are described in Schedule IV of the ODS Rules 2000. In accordance with the Rules, production of products containing Group I, III, IV, and V substances is to be phased out by 1 January 2010.

46. *User registration*: The ODS Rules include compulsory registration of ODS producers, including CFC and CTC producers, manufacturers of ODS-based products, importers, exporters, and any persons who store or sell these chemicals. They are also required to maintain records and to report their production and/or use of ODS to MoEF.

47. *International trade*: Trade of ODS with non-Parties is banned. Export of ODS to non-Article 5 countries is also prohibited. Import and export of ODS are subject to licensing requirement. Furthermore, import of CTC and TCA for feedstock and non-feedstock applications is allowed providing that proper declaration of end-uses is made available to MoEF.

48. *Installation of new production capacity*: Installation and expansion of manufacturing capacity of ODS and ODS-based equipment is prohibited. Purchasers of ODS to manufacture ODS-containing products, are required to declare the purpose for which ODS is purchased.

49. *Promotion of non-ODS alternatives*: The Government of India has been providing fiscal incentives to promote conversion to non-ODS alternatives through exemption of customs duties and excise tax on capital goods required for implementation of ODS phase-out activities. The Government is considering extending these policies to encourage development, production and trade of alternative cleaning equipment and

cleaning materials in the solvent sector. This effort is critical for promoting low cost conversion alternatives in India. However, this would require more efforts in terms of awareness building, training, and other support activities to ensure successful implementation.

50. Import quota system for CTC: An import quota system for CTC will be established. Annual import quotas to be granted by the Government of India will take into account the CTC production quotas for non-feedstock applications granted by the Government based on the ODS Rules 2000. CTC imports for feedstock and exempted applications will be allowed as these uses are not considered as consumption by the Montreal Protocol. To ensure that imported CTC is used by the intended applications, a monitoring system to track the flow of CTC will be established and administered by the management unit proposed under this plan. In addition, enforcement of CTC phase-out in the manufacturing sector will be carried out through the cooperation of the local governments.

51. CTC is consumed in various applications in India. Non-CTC alternatives are available for the metal cleaning and textile solvent sub-sectors. However, most CTC users in these sub-sectors are small and medium scale enterprises, which are large in number and scattered across the country. To completely ban the use of CTC for these applications by 1 January 2005 may not be applicable. Therefore, a gradual phase-out schedule for CTC consumption for these applications as shown in Chapter V is proposed.

52. For the chlorinated rubber and chlorinated paraffin sub-sectors where proposed phase-out plans are already in place, the CTC phase-out plan is therefore proposing a ban of CTC consumption in these applications by 1 January 2005.

53. For the pharmaceutical and chemical solvents sub-sectors, there might be a few applications where alternatives may not be known by these Indian industry sectors. Thus, the CTC phase-out plan is proposing that enterprises in these sub-sectors be required to register their CTC applications with the Government of India. Technical assistance would then be provided to these enterprises to identify suitable alternatives. Once alternatives are defined, these enterprises must submit an action plan for CTC phase-out to the Government. In any case, CTC consumption in these applications will be terminated by the end of 2009.

54. To ensure that there will be incentives for the above enterprises to search for alternatives and eliminate the use of CTC as soon as technically viable, the Government of India will consider, if necessary, adopting a penalty scheme whereby significant fees could be imposed on any use of CTC after 2004.

55. For CTC consuming enterprises already identified under this CTC phase-out plan, except those in the metal cleaning and textile industry, and where non-CTC alternatives are already available but the enterprises may not be able to complete their conversion by the end of 2004, they should submit their action plan to the Government of India. They would be allowed to continue using CTC up to the end of 2005. However, CTC

consumed beyond 2004 should be drawn from existing CTC stockpiles. (This plan is feasible, since properly stored CTC has a very long storage life.) No CTC production or import should be allocated for these enterprises after 2004.

CHAPTER IV SECTOR BACKGROUND

1. Data Collection and Overall CTC Production and Consumption Distribution

56. To identify CTC consumption in all applications in India, the data collection was done through the supply chain. Four different sources of information were used to cross check CTC consumption in various sub-sectors. For the supply side, information pertaining to the production level was solicited directly from the three major producers in India. To verify this data, similar information was obtained from the Ozone Cell. The Ozone Cell also provided information related to imports of CTC by CFC producers. Information on CTC imported by other users in India was collected from enterprises and verified with the Customs Department.

Table IV.1 Supply of CTC (MT)

Source of CTC Supply	1997	1998	1999	2000	2001
Production	15,718	19,225	20,138	17,509	16,459
Imports by CFC Producers	22,328	13,142	23,562	19,220	21,461
Imports by Other Users	519	4,018	898	3,166	3,200
Total Supply	38,565	36,385	44,598	39,895	41,120

57. On the demand side, CTC consumption by the DV acid chloride industry, and process agent industry was mainly provided by the Indian Chemical Manufacturers Association (ICMA) and supplemented by UNIDO and distributors. For the solvent sector, data was provided primarily by local distributors and UNDP. With the cooperation of the CTC manufacturers, all distributors were identified. A complete list of CTC distributors is included in Annex II. Information on CTC consumption by the DV acid chloride industry is complete while the level of confidence on the consumption data for the process agent sector is about 90% - 95%. The uncertainty of 5% - 10% is in the pharmaceutical industry and other miscellaneous applications. For the chlorinated rubber and agro-chemical sub-sectors, the level of confidence of the consumption data is 100%. The consumption data for the pharmaceutical sub-sector was provided by UNIDO and verified whenever possible with the distributors.

58. For the DV acid chloride industry, there are four enterprises. All of them imported some CTC for their production. The level of CTC emissions from this industry is estimated to be much less than 7% of make-up quantities.[8] For the process agent sector, there were two process agent enterprises that import part of their total CTC consumption. No enterprises in the metal cleaning and textile industries import CTC. All CTC consumed by these industries is supplied by the local production. Information provided by the CTC producers confirmed that about 3,600 MT was used in this sector in 2001.

[8] Emissions from this process is less than or equal to the CTC emission level of the existing process applications in non-Article 5 countries as reported in the report of the Process Agents Task Force.

Table IV.2: Demand of CTC in India (MT)

Demand	**1997**	**1998**	**1999**	**2000**	**2001**
Feedstock for CFC Production	30,886	26,354	28,997	25,686	24,298
Export	-	313	67	-	-
Feedstock for DV Acid Chloride	3,437	5,401	7,389	7,501	8,311
Lab Reagents	24	24	24	36	40
Sub-total for Exempted Use	34,347	32,092	36,477	33,223	32,649
Process Agents	2,556	2,293	2,183	1,742	1,742
Solvent Applications	1,662	2,000	5,931	2,805	4,314
Sub-total for Controlled Use	4,218	4,293	8,114	4,547	6,085
Total Demand	41,565	33,866	44,591	37,414	38,705

Table IV.3: Consumption in the Solvent Sector in 2001 as Reported by CTC Producers (MT)

Source of Information	**2001**
SRF	763
Gujarat	1,308
Chemplast	1,543
Total	3,614

2. Process Agents Sector

59. CTC applications in the process agents sector can be categorized into four major categories. These include: (i) chlorinated rubber industry; (ii) agro-chemical industry; (iii) chlorinated paraffin industry; and (iv) pharmaceutical industry. CTC applications under these four categories are listed in Table A of Decision X/14 as approved process agent applications under the Montreal Protocol.

2.1 Chlorinated Rubber Industry

60. There are five enterprises in this sub-sector. These are: (i) Pauraj Chemicals Pvt. Ltd, (ii) Rishiroop Organics Pvt. Ltd, (iii) Rishiroop Polymers Pvt. Ltd, (iv) Rishiroop Rubber International Ltd., and (v) Tarak Chemicals Ltd. The total consumption of CTC in this sub-sector is shown in Table IV.4. Consumption breakdown for each of these enterprises is shown in Annex IV.

Table IV.4: CTC Consumption in the Chlorinated Rubber Sub-Sector

Chlorinated Rubber	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
Pauraj Chemicals Pvt. Ltd.				
Rishiroop Organics Pvt. Ltd.				
Rishiroop Polymers Pvt. Ltd.	277	549.03	602	726
Rishiroop Rubber International Ltd.				
Tarak Chemicals Ltd.				

61. Out of these five enterprises, only one (Rishiroop Organics Pvt. Ltd) has already received funding from the Multilateral Fund. The total CTC phase-out impact of the Rishiroop Organics project is 226.2 MT. To date, a partial phase-out of 157.2 MT has already been attained. When conversion at Rishiroop Organics is completed, additional phase-out of 69 MT of CTC will be achieved. The project is scheduled for completion in early 2003. The aqueous technology developed by Rishiroop Rubber International Ltd, which is the parent company of Rishiroop Organics, has recently been granted with a patent by the Government of India.

62. For the remaining four enterprises, a proposed chlorinated rubber sub-sector plan entails closure/conversion of these remaining facilities has already been submitted for the consideration of the Executive Committee of the Multilateral Fund.

2.2. Agro-Chemical Industry

63. The survey reveals that there are three enterprises in the agro-chemical industry using CTC as a process agent in their production process. E.I.D Parry (India) Ltd. and Excel Industries Ltd. are using CTC for the production of endosulphan. Another company using CTC as a process agent is Hindustan Insecticides Ltd. CTC is used in the dicofol production process. The total CTC consumption for this sub-sector is shown in Table IV.5 while the consumption breakdown for each of these three enterprises is included in Annex IV.

Table IV.5: CTC Consumption in the Production of Agro-Chemicals

	2000 - 2001 (MT)	1999 - 2000 (MT)	1998 - 1999 (MT)	1997 - 1998 (MT)
Endosulphan E.I.D. Parry (India) Ltd. Excel Industries Ltd.	264	524	615	550

Dicofol Hindustan Insecticides Ltd.	69.17	71.06	51.31	99.34
Total	333.17	595.06	666.31	649.34

64. Only Excel Industries has received financial assistance from the Multilateral Fund. At the time the Excel project was submitted for the consideration of the Executive Committee, its CTC consumption was 340 MT. In 2001, it was reported that CTC consumption at this facility reduced to 139 MT. Therefore when completed, this project will result in additional CTC phase-out of 139 MT.

65. Excel Industries eliminates the use of CTC by adopting new technology developed in-house. This is to replace CTC with ethylene dichloride (EDC), a non-ODS solvent. The design of plant-machinery, equipment, storage facilities, safety devices, process control, instruments, effluent treatment plant, utility equipment and analytical instrumentation for the use of non-ODS solvent is completely done by Excel Industries. No foreign collaboration or technical advice was required for plant and process conversion. The Excel project completed at the end of the first quarter of 2001.

2.3. Chlorinated Paraffin (70% chlorine content powder grade)

66. Based on the survey result, it was found that Kedia Organic Chemicals Pvt. Ltd. is the only known enterprise that produces chlorinated paraffin (70% chloride content powder grade) with CTC as a process agent. CTC consumption in this sub-sector for the last four years is shown in Table IV.6

Table IV.6: CTC Consumption as a Process Agent for the Production of Chlorinated Paraffin

	2000 - 2001 (MT)	1999 - 2000 (MT)	1998 - 1999 (MT)	1997 - 1998 (MT)
Kedia Organic Chemical	181	179	155.8	0

2.4. Pharmaceutical Industry

67. The pharmaceutical industry in India is one of the largest among the developing countries. It manufactures about 350 generic pharmaceutical active ingredients belonging to several major therapeutic groups. In the manufacturing of some corresponding intermediates the ozone depleting carbon tetrachloride (CTC) is still used. The following is the list of CTC uses in the production of intermediates for pharmaceutical active ingredients in India.

Table IV.7: Uses of CTC in the production of intermediates for pharmaceutical active ingredients in India

No.	Pharmaceutical active ingredient	Intermediate for which CTC is used
1	Ibuprofen	4-isobutylacetophenone
2	Diclofenac	2,6-dichlorophenol, 1-(2,6-dichlorophenyl)-indolin-2-on
3	Bromohexine	2-nitrobenzylbromide
4	Naproxen	2-acetyl-5-methoxynaphthalene
5	Omeprazole	2-(chloromethyl)-3,5-dimethyl-4-methoxypyridine
6	Chlorphenesin	4-chlorophenol
7	Chlotrimazole	2-chlorobenzotrichloride, 2-chlorotriphenylmethylchloride
8	Norfloxacin	3,4-dichloronitrobenzene
9	Ciprofloxacin	2,4-dichloro-5-fluorobenzoyl chloride, 3,4-dichloronitrobenzene
10	Carbimazole	Bromoacetaldehyde
11	Dexamethasone phosphate	Pyrophosphoryl chloride
12	Betamethasone phosphate	Pyrophosphoryl chloride
13	Estramustine phosphate	Pyrophosphoryl chloride
14	Cloxacillin	Trityl chloride, 4-nitrobenzyl bromide
15	Ceftriaxone	Trityl chloride, 4-nitrobenzyl bromide
16	Cefotaxime	Trityl chloride, 4-nitrobenzyl bromide
17	Ampicillin	Phenylglycin chloride, trityl chloride, 4-nitrobenzyl bromide
18	Cefaclo	Phenylglycin chloride, trityl chloride, 4-nitrobenzyl bromide

68. The survey could identify only 35 pharmaceutical enterprises that have been producing the seven products out of the total of eighteen as listed above. There may be small producers that are not captured in the survey. Breakdown of CTC consumption of each of these enterprises is shown in Annex IV. The total consumption of CTC for each of the seven products is shown in Table IV.9. Out of these 35 enterprises, ten have already received funding from the Multilateral Fund. None of these enterprises have completed their conversion. However, when these projects do complete, they will result in a reduction of 404 MT or 444.4 ODP tons from the 2001 consumption level. It is important to point out that Shashun Drugs Ltd., which is included as one of the producers of ibuprofen, had converted its ibuprofen production to non-ODS process in 1994. However, this enterprise has not yet benefited from any financial assistance from the Multilateral Fund. This company is one of the largest producers of ibuprofen in India.

Table IV.8: Estimated CTC Consumption for the Production Process of Pharmaceutical Products in India

Products	**2000 - 2001 (MT)**	**1999 - 2000 (MT)**	**1998 - 1999 (MT)**	**1997 - 1998 (MT)**
Ibuprofen	169	169	189	424
Bromohexine Hydrochloride	213	186	171	171
Phenyl Glycine	14	14	52	124
Diclofenac Sodium	510	447	417	417
Chlorophenesin	40	39	39	39
Isosorbide Mononitrate	5	5	1	6
Total	951	860	869	1,181

69. The impact of these ten approved projects over the coming years is shown in Table IV.9.

Table IV.9: Projected Impact of Approved Projects (MT) in the Process Agents Sector

	2001	**2002**	**2003**	**2004**	**Total**
Process Agents	139	142	228	103	612

3. Solvent Sector

70. There are four ODS substances that are commonly used as solvent cleaning agents. These are CFC-11, CFC-113, TCA, and CTC. Based on the survey carried out by UNEP, demand for CFC-11, CFC-113 and TCA for the solvent sector is not significant. There is only one enterprise, Bharat Electronics Limited (BEL) using CFC-113 identified during the survey. BEL uses CFC-113 as a cleaning solvent in the manufacture of vacuum interrupters for power supply and distribution. Conversion to replace CFC-113 with TCE as a cleaning solvent is planned. A detailed conversion plan is included as part of the Solvent Sector Strategy prepared by the Government of India and UNEP. A copy of the Solvent Sector Strategy is included as Attachment I.

71. With regard to CTC consumption, the survey identified three major applications: cleaning solvent for metal cleaning applications, cleaning solvent for stain removing in the textile industry, and chemical solvents in the pharmaceutical industry. Small consumption is identified in several small companies. However, specific information pertaining to the applications of CTC is not available. Further investigation will be carried out during implementation of the CTC phase-out plan.

3.1. CTC Used as Stain Remover in the Textile Industry

72. While it is expected that there are a larger number of small users in the metal cleaning and textile industry, the survey was able to identify only 146 enterprises using

CTC as solvents which include, 66 enterprises using CTC for metal cleaning purposes, and 80 enterprises in the textile industry. A list of identified CTC users in the metal cleaning including their consumption is included as Annexes V. A list of CTC users in the textile industry is included as Annex VI. The survey carried out by UNDP estimates that 1,500 MT of CTC is consumed by the textile industry. It is estimated that there are about 1,000 garment manufacturers and export houses using CTC for stain removal. CTC dealers confirmed that this consumption is distributed among a large number of small CTC users, which presents the most difficult communication and phase-out scenario to the Government of India.

73. For the textile industry, it is recognized that to properly introduce alternatives in this sub-sector, assistance to be provided to the enterprises should include proper training and equipment to ensure that safety of workers is addressed. At least, training on proper handling of non-CTC alternatives and proper ventilation equipment should be provided.

3.2. Metal Cleaning Industry

74. It was reported that major applications are in engineering industries, heavy machinery industries, power plants, metal cleaning in steel plants, refrigeration and air-conditioning component manufacturing industry, cleaning of metallic components in printing industry, electronic component cleaning, etc. Since the three CTC producers in India confirmed that 3,614 MT of CTC was used in the solvent sector (metal cleaning and textile industries), after deducting the 1,500 MT consumption in the textile industry the total consumption of CTC in the metal cleaning industry in 2001 was 2,114 MT. The survey was able to identify names of the users that accounted for 1,185 MT of CTC. Identification of remaining users will be carried out during the implementation of this plan.

75. As shown in Figure II.1 and Table II.1, sales of more than 90% of CTC supplied by local distributors and retailers, which are mainly for the solvent sector (metal cleaning and textile industries), were made by distributors located in Tamil Nadu, Gujarat, Maharashtra, and Delhi. These States are close to the CTC production centers. Moreover, large transactions of CTC sales in these States imply that actual consumption of CTC is likely to concentrate in these States. This CTC phase-out strategy for the solvent sector will employ this information pertaining to geographic distribution of CTC sales as a basis for the development of an action plan and priority to address CTC phase-out.

76. To date, 5 of the total 66 identified metal cleaning enterprises have already received financial assistance from the Multilateral Fund. The total CTC consumption of these 5 enterprises is 111 MT out of the total identified use of 3,614 MT in 2001.

Table IV.10: Projected Impact of Approved Projects (MT) in the Solvent Sector

	2001	**2002**	**2003**	**2004**	**Total**
Solvent Sector	4	6	52	49	111

77. In addition to this, there are four additional projects, which are identified and being proposed as part of this CTC phase-out plan. CTC phase-out captured by these individual enterprises is given in the table below.

Table IV.11: List of Identified CTC Users for Metal Cleaning Applications

Name of the Company	MT phased out
Nissan Copper Private Limited	90
Western Engineering Limited	35
Steel Authority of India Limited	186
Hind Metals and Tubes	48
Total	**359**

3.3. Chemical Solvents

78. There are 32 enterprises identified under this category of CTC uses. One of them, Nagarjuna Agrichemicals, was recently established in April 2002. Its consumption, which started in 2002, is, therefore, not being captured. No funds are being requested from the Multilateral Fund for phasing out CTC at this enterprise. The total consumption for each application including the names of the companies producing each of these products is shown in Table IV.12. Breakdown of CTC consumption of these enterprises can be found in Annex VII.

Table IV.12: Estimated CTC Consumption for Applications not Listed in Table A of Decision X/14

Product/Enterprise	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
Dexamethasone Phosaphate, Betamethasone Phosphate etc. (Pyrophosphoryl Chloride)				
Kemix Chemicals				
Nikava Pharmaceuticals				
Sub Total	49.5	47	47	47
Candesartan, Ceftazidime, Indeloxacine, Remoxirpide etc. (Trityl Chloride)				
Corvine Chemicals				
Soduim Metal				
Prashanthi Laboratories				
Yenkey Drugs and Pharmaceuticals Ltd				
Sub Total	118	100	82	87
Carbimazole (Bromoacetaldehyde)				
Innova Laboratories				

Sub Total	7	6	6	6
Para Nitro Benzyl Bromide				
Leeds Kem				
Panchsheel organics				
Rajesh Chemicals				
Saurav Chemicals				
Flame Pharmaceuticals				
Sub Total	94.3	148.2	165.1	168.1
Benzophenone				
Dharamasi Morarji Chemicals Ltd.				
Sub Total	41	40	38	38
Bromobenzine				
BEC Chemicals Pvt Ltd				
Sub Total	0	0	0	8
Ethyl 4- Chloro Aceto Acetate				
Avon Organics Ltd				
Sub Total	10	10	10	10
Chloropyriphos				
Nagarjuna Agrichemicals	0	0	0	0
Sub Total	0	0	0	0
Miscellaneous Applications				
Nitya Pharmaceuticals				
Balaji Pharma				
Divis Laboratory				
Laxmi Agrochemicals				
Fisher Inorganics and Chemicals				
Medo Pharmaceuticals				
Trident Healthcare				
Hetero Drugs				
Indian Drugs and Pharmaceuticals Ltd.				
Hyderabad Chemicals				
Omtech Chemicals				
Symed Laboratory, Hyderabad				
Pearl Organics				
Eupharma Laboratories Ltd.				
Micronova Pharmaceuticals,Bangalore				
Sub Total	105	105	105	105
Total	424	455.4	452.25	468.05

79. The survey results indicate that there are about 380 MT of CTC consumed in the applications that are unknown during the preparation of the CTC phase-out plan. Efforts have been made to identify the users. However, only 15 enterprises including their enterprise-level consumption were identified. The combined consumption of these 15 enterprises in 2001 was 105 MT. More efforts will be done during the implementation to

identify remaining users as well as to determine exact applications of this consumption. Since it was not possible to obtain all the detailed technical information for all CTC consumption in the chemical solvent sub-sector during the preparation of this plan, it is uncertain whether non-CTC alternatives would be available for all these applications. Therefore, a technical assistance component will be proposed in the later chapter to ensure that sufficient resources will be made available to these enterprises to identify alternative chemicals or alternative processes in order to eliminate the use of CTC.

Chapter V CTC Phase-out Strategy

1. INTRODUCTION

80. The study shows that without further action taken by the Government and without additional intervention from the Multilateral Fund, India will not be able to meet its 85% CTC consumption reduction target by 1 January 2005 and a complete phase-out by 1 January 2010 as required by the Montreal Protocol. Based on the CTC consumption data for 1998 – 2000 as reported by the Government of India to the Ozone Secretariat, the baseline CTC consumption and production levels for India, are 11,505 ODP tons and 11,553 ODP tons, respectively. Assuming that without further action and new intervention from the Government of India and the Multilateral Fund, the CTC consumption level in India will remain at the 2001 level of 6,662 ODP tons. This statement is made without any provisions for either growth or decline of CTC demand in the future.

81. Since the maximum allowable CTC consumption level between 2005 and 2009 is 15% of the baseline level or 1,726 ODP tons, to achieve this target by 1 January 2005 additional phase-out of at least 5,000 ODP tons is required between 2002 and 2004. This objective of this chapter is to point out where additional CTC phase-out could be obtained and what additional policy measures should be put in place in order to ensure permanent and sustainable phase-out of CTC.

2. PROPOSED POLICIES AND STRATEGIES

82. It is the policy of the Government of India to impose bans on the use of CTC in the manufacturing sector by 1 January 2010. This long lead-time is required considering the large number of small users that are scattering all over India. However, to ensure that sufficient phase-out of CTC will be attained in the next two years prior to the 85% consumption reduction obligation of the Montreal Protocol taking effect, the Government of India would take suitable supportive measures to restrict the supply and demand of CTC for the consumption sector. CTC is mainly used as a feedstock, process agent and solvent. CTC is produced as well as imported. To control supply of CTC, the following strategy is being proposed.

83. The Government of India is developing a CTC production phase-out plan, which is part of this overall CTC phase-out plan. Within the context of the CTC production phase-out plan, a production quota for the overall CTC production for non-feedstock applications (consumption as defined by the Montreal Protocol). An annual production quota for each of the CTC producing enterprises will be agreed upon by the Association of Chloromethane Manufacturers (ACM) during the development of the CTC production phase-out plan. The production quotas for non-feedstock applications will be given to each of the CTC manufacturers on an annual basis. It is anticipated that the CTC quota system for non-feedstock applications will be similar to the CFC production quota system that is already in place now. However, the actual arrangement of this quota system will be discussed further with ACM. It is recognized that any proposed quota system must

incorporate a certain level of flexibility to allow transfers of quotas among CTC producers given that the strategy for phasing out CTC in the production sector may entail industrial rationalization. This production phase-down schedule is considered as a critical component of the overall CTC phase-out plan as it is an important tool to accelerate conversion in the consumption sector.

84. Currently, imports of CTC for non-feedstock applications are allowed only for manufacturers in the process agent sector. These manufacturers are generally large in size and hence, CTC phase-out in these manufacturers should be given high priority. Since a total ban on CTC consumption cannot be put in place in the near future as it could have detrimental effect on a large number of small CTC users particularly those in the metal cleaning and textile industry, the Government of India is requesting financial assistance from the Multilateral Fund to support the phase-out of CTC consumption in the process agent sector. Moreover, the Government of India is also requesting funding for enterprises in other sectors that have been identified during the preparation of this CTC phase-out plan. This is to ensure that all these enterprises would be able to complete their conversion process by 1 January 2005, before the 85% consumption reduction requirement takes effect. It would enable the Government of India to achieve additional phase-out of at least 2,408 ODP tons of CTC before 1 January 2005.

85. In addition, the Government of India, in close cooperation with all Implementing Agencies, to ensure that all approved projects in the process agents sector and the solvent sector, will be completed as scheduled or before 1 January 2005. This will result in additional phase-out of 795 ODP tons of CTC.

86. This will enable the Government of India to reduce its CTC consumption of about 3,203 ODP tons from the current consumption of 6,662 ODP tons prior to 1 January 2005. However, this will not be sufficient for India to meet the 85% consumption reduction requirement as the maximum allowable consumption level from 1 January 2005 is 1,726 ODP tons. Additional efforts have to be made in order to phase out CTC consumption in the remaining CTC solvent users particularly those in the textile industry and small users in the metal cleaning sub-sector.

87. To achieve this additional phase-out, both investment and non-investment activities to promote the use of alternatives in the textile industry and small users in the metal cleaning sub-sector will be promoted. The efforts will initially be focused on a few states where large consumption is reported. The success of these initial activities will be further replicated in other states. This is to ensure that complete phase-out will be achieved by 1 January 2010. To ensure that CTC phased out from this plan will be sustainable, an import quota system and monitoring and enforcement measures described in Chapter III will be introduced.

3. IMPACT OF APPROVED PROJECTS AND NEWLY PROPOSED ACTIVITIES

88. The current consumption of CTC, as defined by the Montreal Protocol, in India in 2001 was about 6,662 ODP tons. Assuming that without any further intervention by

either the Government of India or the Multilateral Fund, the present level of consumption will remain unchanged. As mentioned above, no projected growth or projected decline in the CTC demand is allowed in this scenario. Under this scenario, it is obvious that the Government of India will not be able to achieve the 85% consumption reduction target by 1 January 2005. The maximum allowable CTC consumption level for 2005 to 2009 is 1,726 ODP tons.

89. There are five CTC phase-out projects in the solvent sector that have already received funding from the Multilateral Fund, and are under implementation. The survey conducted under this study reveals that in 2001 the total consumption of CTC of these seven projects was 111 MT. This consumption will be eliminated gradually over the period from 2001 to 2004, as completion of these five projects will take place in different years. Further, four projects have been identified for phasing out of 359 MT of CTC in solvent sector. These projects form part of the CTC phase-out plan.

90. In addition, the Executive Committee of the Multilateral Fund has already approved 12 projects in the process agents sector in India. All approved projects, except the Excel (elimination of CTC consumption at the endosulfan production facility) project, are still on-going. The Excel project was completed in March 2001. Its last year CTC consumption (in 2001) was 139 MT about 40% of the consumption level at the time when its project was submitted for the consideration of the Executive Committee.

91. The remaining 11 projects in the process agents sector are expected to complete during 2002 to 2004. When complete, these projects will result in additional CTC phase-out of 473 MT. This amount of additional phase-out is less that the amount that these 11 enterprises consumed at the time of submission of their projects. Again, this means that partial phase-out has already taken place.

92. With no further intervention from the Multilateral Fund, except completion of all approved projects, the net CTC phase-out by 2004 is 723 MT. This is far below what is required in order to meet the maximum allowable CTC consumption level for 2005. The survey has identified a number of enterprises that are consuming CTC in 2001 and ready to eliminate their CTC consumption providing that financial assistance is provided to support their conversion activities. In fact, some of these enterprises already have their conversion projects prepared by the Implementing Agencies. These projects include the CTC phase-out plan for the chlorinated rubber sub-sector, the investment project for phasing out CTC consumption in the production of chlorinated paraffin (70% chlorine content powder grade), and a few projects in the pharmaceutical sub-sector.

93. In summary, the proposed CTC phase-out plan has identified that additional CTC phase-out of the following quantities can be achieved by the end of 2004:

Table V.1: Potential CTC Phase-out from Identified CTC Users

Sector/Sub-Sector	**MT of CTC**
Chlorinated Rubber	208
Chlorinated Paraffin	181

Pharmaceutical Industry	547
Agro-Chemical Industry	194
Pharmaceutical Industry (Chemical Solvent)	700
Metal Cleaning	359
Total	2,189

94. Taking into account CTC to be phase-out from approved projects and newly proposed projects as mentioned above, a total CTC phase-out expected from these activities is about 2,912 MT. Given that the 2001 consumption is 6,056 MT, to reduce the current consumption level to 1,569 MT by 2005 additional interventions, in addition to approved projects and new investment activities shown in Table V.1, are required in order to reduce the consumption down further by another 1,575 MT.

95. The CTC producers informed that they sold about 3,614 MT of CTC to the solvent sector in 2001 of which, 2,114 MT was consumed in the metal cleaning sub-sector and about 1,500 MT in the textile industry. This consumption scatters among a large number of small users in the metal cleaning and textile cleaning industry. Therefore, the Government of India proposes to undertake a series of investment and non-investment activities to address CTC phase-out in these small-scale users.

96. The survey result indicates that more than 80% of CTC sold by distributors is concentrated in three States in India. These are Gujarat, Maharashtra, and Tamilnadu. A geographic distribution of CTC sales in India is shown in Figure II.1. In Maharashtra State and Tamilnadu State, the total sales in 2001 were 2,717 MT and 1499 MT, respectively. Therefore, during the first few years of the implementation of the CTC phase-out plan, additional investment and non-investment activities to identify more users in these three States. It is expected that at least 1,600 MT of CTC will be phased out from these three targeted States by the end of 2004.

97. Through this targeting of high volume use strategy, India will be able to achieve its interim phase-out target in 2005 and complete phase-out target in 2010. The phase-out scenario based on the above strategy is shown in Table V.2.

98. Given the large consumption reduction must be achieved within less than two years after the CTC phase-out plan is approved, it is recognized that some enterprises may not be able to meet the 1 January 2005 phase-out deadline as proposed above. Therefore, the Government of India will consider allowing enterprises in the pharmaceutical sub-sectors that alternatives are not known by the industry to register their CTC applications with the Government. Technical assistance would then be provided to these enterprises to search for suitable alternatives. Once alternatives are identified, these enterprises must submit an action plan for CTC phase-out to the Government. In any case, CTC consumption in these applications will be terminated by the end of 2009 at the latest.

99. For those CTC consuming enterprises where alternatives are available but they may not be able to complete their conversion by the end of 2004, they should submit their

action plan to the Government of India. They would be allowed to continue to use CTC up to the end of 2005. However, CTC consumed beyond 2004 should be drawn from existing CTC stockpiles. No CTC production or import should be allocated for these enterprises after 2004.

100. In light of the above possible phase-out delays, the Government of India should be allowed to adjust its annual CTC phase-out targets for various sectors/applications in such a way that the total CTC consumption will not exceed the total allowable annual CTC consumption targets as proposed in this plan. Moreover, the total allowable annual CTC consumption targets from 2005 onwards will be used as a basis for development of a performance-based agreement between the Government of India and the Executive Committee of the Multilateral Fund.

Table V.2: Proposed CTC Consumption Phase-out Scenario (MT)

Consumption (MT)	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Proposed Consumption Scenario	6,056	5,913	5,765	5,485	1,543	1,043	643	243	43	0
Phase-out from approved projects										
Process Agent	139	142	228	103						
Solvent Sector	4	6	52	49						
Sub-Total	143	148	280	152	-	-	-	-	-	-
New Activities										
Process Agets Sector										
Chlorinated Rubber				208						
Chlorinated Paraffin				181						
Pharmaceutical Industry				547						
Agro-Chemical Industry				194						
Solvent Sector										
Pharmaceutical Industry				700						
Metal Cleaning				359						
Textile Industry				900	200	200	200			
Metal Cleaning in SMEs			-	700	300	200	200	200	43	
Sub-Total	-	-	-	3,790	500	400	400	200	43	-
Montreal Protocol Limit					1,569	1,569	1,569	1,569	1,569	0.00

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Proposed Consumption Scenario	6,056	5,913	5,765	5,485	1,543	1,043	643	243	43	0
Cumulative Impact of Approved Project	143	291	571	723	723	723	723	723	723	723
Cumulative Impact of New Activities	-	-	-	3,790	4,290	4,690	5,090	5,290	5,333	5,333
Montreal Protocol Limit					1,569	1,569	1,569	1,569	1,569	-

Chapter VI CTC Phase-out Activities for the Process Agents Sector

1. Introduction

101. As pointed in Chapter V, it is important for India to reduce its consumption of CTC in an expeditious manner in order to meet the 85% consumption reduction target in 2005 and 100% phase-out by 1 January 2010. Based on the data reported by the Government of India to the Ozone Secretariat in accordance with Article 7 of the Montreal Protocol, the CTC baseline level consumption for India (an average consumption level between 1998 and 2000) is 11,505 ODP tons. Therefore, by 1 January 2005 the allowable consumption level for India is 1,725.75 ODP tons, and zero by 1 January 2010.

102. The survey conducted as part of the preparation of this CTC phase-out strategy suggested that the current CTC consumption in 2001 is about 6,056 MT. Therefore, to meet the 85% consumption reduction target, CTC phase-out of 4,487 MT is required between 2003 and 2004. To achieve this phase-out level, India must phase out all use of CTC in the process agent sector. The survey result indicates that about 1,742 MT of CTC was consumed in this sector in 2001. In addition, 700 MT of CTC is consumed as a chemical solvent, and 3,614 MT is consumed in textile cleaning and metal cleaning applications in the solvent sector. Part of the CTC phase-out tonnage from the process agent sector and the metal cleaning industry will come from the completion of the on-going phase-out activities in these sectors.

103. Completion of the on-going projects in the process agents sector (chlorinated rubber, pesticide, and pharmaceutical products) will result in additional phase-out of 612 MT. In addition, completion of the on-going projects in the metal cleaning sub-sector will also result in additional phase-out of 111 MT. Completion of all on-going projects will result in a total CTC phase-out of 723 MT. Therefore, between now and the end of 2004 more activities should be carried out in order to achieve additional CTC phase-out of at least 3,764 MT. This clearly has to come from conversion of CTC consumption in all sectors (i.e., the process agents industry, metal cleaning industry and the textile industry).

2. Process Agents Sector

104. It is reported that 1,742 MT of CTC was consumed in the process agents sector in 2001. There are four major applications of CTC in the process agents sector. These are the (a) chlorinated rubber, (b) chlorinated paraffin, (c) agro-chemical, and (d) pharmaceutical sub-sectors. The following sections propose additional activities to be carried out in India to ensure that all CTC consumption in the process agents sector will be eliminated by 1 January 2005.

2.1 Chlorinated Rubber Sub-Sector

Investment Activities

105. The Executive Committee has already approved one project to eliminate the use of CTC as a process agent in the production of chlorinated rubber at Rishiroop Organics. At the time of approval, Rishiroop Organics consumed about 226.2 MT or 248.82 ODP tons of CTC. The total approval for this project is US$2,074,300. This approval amount is for supporting Rishiroop Organics to convert its production facility to an aqueous media technology. This aqueous media technology completely eliminates the use of CTC in the production process for chlorinated rubber. This technology was developed by Rishiroop Rubber International. The Government of India has granted Rishiroop Rubber International a patent for this technology on March 15, 2003.

106. There are four remaining chlorinated rubber manufacturers in India that have not converted to CTC-free technology. These are Pauraj Chemicals, Tarak Chemicals, Rishiroop Rubber International, and Rishiroop Polymers. A sub-sector plan for phasing out CTC consumption in the chlorinated rubber industry in India was submitted for consideration of the Executive Committee in 2002. The proposal was reviewed by the Secretariat of the Multilateral Fund, and the funding level of US$ 4.33 million was accepted.

107. With this approval, the Indian chlorinated rubber industry as a whole will be able to completely eliminate the use of CTC in their production processes. The approved funding will be allocated to the four remaining enterprises. Some of them may convert their process to an aqueous media technology or opt for the option to shut down their production by the end of 2004. Therefore, by 1 January 2005 additional CTC phase-out of 208 MT or 229 ODP tons from the 2001 CTC consumption level will be realized.

2.2. Chlorinated Paraffin Sub-Sector

Investment Activities

108. The survey conducted during the preparation of this CTC phase-out plan found that Kedia Organic Chemicals in Vapi, is the only known manufacturer producing chlorinated paraffin. CTC is used as a process agent in the manufacturing of this product. Chlorinated paraffin is an important flame prevention additive in coatings, inks, plastics, foams, adhesives, paints, paper and fabrics.

109. The project proposal for conversion at Kedia Organic Chemicals has already been considered by the Secretariat of the Multilateral Fund. In fact, the funding level for this project has already been agreed upon. However, the Executive Committee has not approved this project (Dec. 38/54) because the Government of India has not been able to provide it with confirmation that Kedia Organic Chemicals is the only remaining manufacturer of chlorinated paraffin that uses CTC as a process agent.

110. With the confirmation from the Government of India, it is anticipated that this project will be approved by the Executive Committee with the funding level of US$ 1,140,843. The detailed project document for this project has already been submitted to the Secretariat of the Multilateral Fund. Conversion at this enterprise will result in addition phase-out of 181 MT or 199.1 ODP tons from the 2001 CTC consumption level.

2.3. Pharmaceutical Sub-Sector

Investment Activities

111. A total number of 35 pharmaceutical manufacturers were identified as potential users of CTC as a process agent in the applications listed in Table A of Decision X/14. However, only 15 enterprises have evidence of CTC consumption in 2001. Therefore, the funding level to be requested as part of the CTC phase-out plan will focus on the identified consumption. The remaining enterprises do not consume CTC. These companies do not have any need for CTC as the intermediate chemicals that are normally produced with CTC, are probably purchased from other manufacturers or from imports.

112. Out of the 15 known users of CTC as a process agent, ten enterprises have already received funding from the Multilateral Fund. Brief descriptions of the ten approved projects are summarized below. Only five of the remaining un-funded enterprises consumed CTC in 2001. These five un-funded enterprises are producing four different products: 4 – isobutylacetophenone for the production of ibuprofen, 2,6 dichlorophenol for the production of diclofenac sodium, 4 chlorophenol for the production of chlorophenesin, and isosorbide mononitrate.

Table VI.1: Summary of Previously MLF Approved Projects

Enterprise	Application	Major Cost Components	ODP Impact (ODP tons)	Approved Funds (US$)
Satya Deeptha Pharmaceuticals	Ibuprofen	CTC is replaced with ethylene dichloride. Conversion requires new reactors, high vacuum distillation system, refrigeration plan, effluent treatment plant and civil works.	27.92	260,133
Doctors Organic Chemicals	Ibuprofen		94.60	288,809
Chiplun Fine Chemicals	Ibuprofen		16.72	155,830
Svis Labs	Ibuprofen		54.17	249,547
Sub-total			193.41	954,319

Amoli Organics	Diclofenac	CTC is replaced with cyclohexane. Conversion requires new storage tanks, agitated Nutch filter with cooling jacket, solvent recovery and rectification unit, nitrogen generator, chilling plant, vacuum system, compressed gas generator, and fixed fire fighting system.	38.50	385,367
Sub-total			38.50	385,367
FDC	Bromohexine HCL	CTC is replaced with mono-chlorobenzene. Conversion requires new glass-lined reactor, centrifuge, vacuum system, brine chilling plant, fixed fire fighting system.	34.10	238,371
GRD Chemicals	Bromohexine HCL		17.93	127,667
Benzo Chemical Industries	Bromohexine HCL		23.00	136,786
Pradeep Shetye	Bromohexine HCL		133.87	279,001
Sub-total			208.90	781,825
Alpha Drugs India	Phenyl Glycine	CTC is replaced with trichloromethane. Conversion requires new glass-lined reactor, dryer with solvent recovery system, storage tank.	69.70	145,867
Sub-total			69.70	145,867

113. The overall cost-effectiveness for all process agent projects previously approved by the Multilateral Fund in the pharmaceutical industry is approximately US$ 4.44/kg ODP, while the historical average cost-effectiveness of each application is summarized below:

Table VI.2 Average Cost-Effectiveness of Previously Approved Projects in the Pharmaceutical Industry in India

Application	Average Cost-Effectiveness ($ /kg ODP)
Ibuprofen	4.93*
Diclofenac	10.01

Bromohexine HCL	3.74
Phenyl Glycine	2.09
Overall Average C.E.	4.44

*However, Dec. 32/60 stated that the cost-effectiveness level for the Ibuprofen project for Chiplun could not be worse than that presented in the projects approved at the 32nd meeting. The cost-effectiveness level of those projects approved at the 32nd Meeting was between US$ 2.09 and US$ 9.32 per kg ODP.

114. The remaining un-funded pharmaceutical manufacturers that were still consuming CTC in 2001 including the proposed funding requests to support their conversion are shown in Table VI.3. The funding request proposed for the Dr. Reddy's Lab conversion is based on the average cost-effectiveness pertaining to the other ibuprofen projects previously approved for India. For other enterprises, since there are no similar projects approved for such applications. Thus, proposed funding requests are determined on the basis of the overall cost-effectiveness of all pharmaceutical process agent projects previously approved for India by the Multilateral Fund (US$ 4.44/kg ODP).

Table VI.3 : Requested Funding for Remaining Pharmaceutical Manufacturers

Entreprise	**Applications**	**MT in 2001**	**ODP tons in 2001**	**Requested Funds (US$)**
Dr. Reddy's Lab*	Ibuprofen	26	28.6	260,000[9]
Kairav Chemicals*	Diclofenac Sodium	475.6	523.16	5,236,830
Unilab Chemicals & Pharmaceuticals**	Chlorophenesin	40.1	44.11	195,848
Alliance Laboratories**	Isosorbid Mononitrate	1.2	1.32	5,861
Micals Pharma **	Isosorbid Mononitrate	4.2	4.62	20,513

*The level of requested funding is based on the historical average cost-effectiveness of similar projects previously approved for these particular applications for India.
** Requested funds are made on the basis of the overall cost-effectiveness value for all projects previously approved since no projects for these particular applications have been approved by the MLF to date.

Technical Assistance Component

[9] The cost-effectiveness level of US$9.09 per kg ODP is used, instead of US$ 4.93. This is in line with Dec. 32/60.

115. Ibuprofen – The initial step in production of the anti-inflammatory drug Ibuprofen involves the Friedel Crafts acylation of isobutyl benzene with acetyl chloride in the presence of aluminium chloride and a suitable solvent, and in the initial patent CTC was used for this purpose. However, a range of solvents might be employed and it is reported in the Process Agents Task Force report that ethylene dichloride (EDC) is an acceptable substitute for CTC, based on its zero ODP. It is important to emphasize that when EDC is chosen as an alternative, proper safety measures must be put in place to ensure workers' safety. Since non-CTC alternatives have already been determined and similar conversions have already been implemented in India, no funding to assist the enterprise to identify alternative chemicals or processes is included.

116. Diclofenac Sodium – This anti-inflammatory drug has been synthesized in a number of ways including the use of oxalyl chloride and a Friedel Crafts reaction catalyzed by aluminium chloride. It is reported that CTC is used because of its good solvent power. Alternatives to CTC have already been identified.

117. Chlorophenesin – According to the Process Agents Task Force report identified alternatives for this application are still unknown. No similar conversions have been approved for India by the Multilateral Fund. Therefore, a funding request to identify suitable alternatives for eliminating the use of CTC in the production of chlorophenesin is included in this proposed CTC phase-out plan. It is possible that CTC phase-out in this application may take place after 1 January 2005. Therefore, the CTC phase-out plan and its associated schedule have already taken into account possibility of prolonged use of CTC in this application up to 2010.

118. Isosorbid Mononitrate – Isosorbid Mononitrate is a vasodilating drug, similar in its effect to the nitro-glycerine (glyceryl trinitrate) that is used by angina sufferers. It is reported in the Process Agents Task Force report that the dinitrate, and presumably the mononitrate, may be prepared from sorbitol by reaction with a typical nitric-and-sulphuric acid nitrating mixture. The published chemistry provides no indication of the use of CTC. While identified alternatives are available, the enterprises may still require technical assistance to determine suitable alternatives, among those already identified, for their processes. Therefore, funding to determine the suitable alternatives for these enterprises are included as part of the proposed CTC phase-out plan.

119. It is proposed that the total funding request of US$ 40,000 be included in the CTC phase-out plan in order to assist the above enterprises to identify suitable alternative chemicals or processes for eliminating the use of CTC. This funding will also be utilized to support enterprises' effort in evaluating efficacy of the proposed alternatives.

2.4. Agro-Chemical Sub-Sector

Investment Activities

120. For the agro-chemical sub-sector, the survey found three major users of CTC as a process agent. The three companies are E.I.D. Parry (India), Excel Industries, and

Hindustan Insecticides. The first two are manufacturing endosulfan with CTC as a process agent. Hindustan Insecticides is using CTC as a process agent for the production of 1-1, Bis (4-chlorophenyl) 2,2,2-trichloroethanol, which is an intermediate chemical for the production of dicofol. Excel Industries has already received funding from the Multilateral Fund to phase out the use of CTC in its production process, replacing the current CTC with EDC. The cost-effectiveness of the conversion project for Excel is US$ 0.98/kg ODP.

121. It is reported that the initial patent for endosulfan does not describe the use of a solvent during the second stage of the production process. This is possible as some manufacturing plants may choose to operate by using excess thionyl chloride as a solvent, which is recovered when the reaction has taken place. Other manufacturing plants may use CTC as process agent solvent. The Process Agents Task Force report suggested that CTC should be easily replaced and several companies have already converted to non-CTC alternatives. One company uses ethylene dichloride (EDC) while another reports successful use of an aromatic solvent, but in the latter case flammability of the selected solvent may be an issue. It is reported that the adoption of the alternatives requires only a small change in the production process.

122. E.I.D. Parry (India) indicated that it has already initiated a conversion plan to eliminate the use of CTC in its process. A change in the production process is required. Tolouene is being considered as an alternative. It is anticipated that to maintain the existing production capacity of endosulfan at its facility, steam consumption and refrigeration load would increase. To assist the enterprise to determine detailed technical requirements for the conversion project, technical assistance may be required. Therefore, it is proposed that an allocation of US$5,000 be allocated for supporting this technical assistance component.

123. Mites and ticks are controlled with the acaricide Dicofol, the molecule of which is closely related to DDT. Dicofol is in fact prepared from DDT. CTC is used as a solvent in two of the three stages of that process. In the second stage, the reaction involves chlorination, and so a non-reactive solvent is required. However, in the third stage CTC is used as a water-immiscible solvent to extract the Dicofol product. It is reported that dichloroethane (ethylene dichloride) is an acceptable substitute for CTC, although certain technical changes are required in both stages. Since no similar conversion projects have been approved by the Multilateral Fund for this particular application, it is likely that technical assistance may be required to enable the enterprise to assimilate this new alternative technology. Therefore, a funding request to prepare an engineering plan for the conversion is included.

124. Hindustan Insecticides is in the process of selecting an alternative process for the production of dicofol. The CTC phase-out plan is proposing a funding request of US$315,774 to support part of the conversion costs at this facility. Since there have not been any similar projects approved for India by the Multilateral Fund, no historical cost-effectiveness number is available for this particular application. Therefore, the funding level proposed for this enterprise is made on the basis of the overall cost effectiveness of

the whole process agent sector. The overall cost-effectiveness for chlorinated rubber and pharmaceutical projects is US$ 4.15/kg ODP. It is anticipated that actual costs of conversion would be much higher than the level of funding being requested by this proposed CTC phase-out plan.

Table VI.4: Proposed Funding Requests for the Remaining CTC Process Agent Users in the Agro-Chemical Industry

Enterprise	Application	ODP Impact (ODP tons)	Requested Funds (US$)
E.I.D. Parry (India)*	Endosulfan	137.50	134,750
Hindustan Insecticides	Dicofol	76.09	315,774
Total		**213.59**	**450,524**

*The funding request is made on the basis of the cost-effectiveness of the Excel project, which is US$ 0.98/kg ODP.

Technical Assistance

125. To assist the two enterprises in the agro-chemical industry to determine appropriate alternatives and detailed engineering plan to convert their existing production facilities, a funding request of US$15,000 (US$5,000 for E.I.D. Parry and the balance for Hindustan Insecticides) is included as part of the CTC phase-out plan. This will also allow the two enterprises to undertake required actions to ensure the efficacy of their new processes.

Chapter VII CTC Phase-out Activities for the Solvent Sector

1. Introduction

126. India's solvent sector CTC consumption primarily includes CTC use in textile cleaning applications, metal cleaning applications, and CTC use as a solvent in pharmaceutical industry chemical processes. Of the total CTC consumption in the solvent sector of 3,614 MT, the textile cleaning and metal cleaning applications are estimated to consume 1,500 MT and 2,114 MT, respectively. Additional consumption of 780 MT of CTC is used in a number of pharmaceutical enterprises. Not all users of this 780 MT of CTC are known. However, for the known applications, it is found that they are not listed in Table A of Decision X/14. Therefore, the Government of India has decided to request financial assistance for phasing out this CTC consumption as part of its strategy to phase out CTC in the solvent sector.

2. Metal Cleaning

127. To date the Multilateral Fund has already approved sixteen projects for the solvent sector in India. Of these sixteen projects, there are only five incompleted projects that are still on-going in 2002. While most of the solvent projects approved for India involved elimination of more than one chemical, the five projects that are still on-going in 2002 will result in the phase-out of one chemical, CTC. The total amount of funds approved and ODP to be phased out from these projects aggregate to US$ 1.46 million and 118 ODP tons, respectively. These projects are scheduled to complete within the period from 2002 - 2004. The average cost-effectiveness of these five CTC conversion projects in the metal cleaning application will be US$12.40/kg ODP.

Investment Activities

128. In addition to this, additional projects have been identified for which funding requests are included as part of this CTC phase-out plan. The details of such projects are given in Attachments 2 – 5 with ODP phase-out impact and funding requests summarized in the table below.

Table VII.1: List of New Individual Investment Activities

Name of the Company	**ODP MT phased out**	**Funds requested in USD**
Nissan Copper Private Limited	99.0	986,177
Western Engineering Limited	38.5	510,724
Steel Authority of India Limited	205.03	2,894,460
Hind Metals and Tubes	52.8	486,700
Total	**395.33**	**4,878,061**

129. Thus the total expected CTC phase-out from the already approved and identified projects is estimated at 513 ODP tons. In the metal cleaning industry, the estimated quantity of CTC consumed is 2,114 MT (or 2,325 ODP tons). Therefore, additional efforts to phase out the remaining consumption of 1,812 ODP tons (2,325 ODP tons minus 513 ODP tons) are required in order to achieve complete phase-out of CTC in this sector.

130. The survey carried out during the preparation of this CTC phase-out plan was able to identify users and industries that could consume CTC up to 1,185 MT (or 1,304 ODP tons). In addition to the five enterprises whose conversion projects have already been approved by the Multilateral Fund and the four newly identified enterprises whose detailed conversion plans are included as attachments to this CTC phase-out plan, there are another 57 small CTC users in the metal cleaning sector identified by the survey. Additional efforts to address CTC phase-out in additional remaining enterprises will be carried out during the implementation of the proposed CTC phase-out plan.

131. Except the four enterprises identified above, no baseline information of other CTC users in the metal cleaning sector is available. To determine the funding level for phasing out the remaining consumption of CTC, the historical average of the cost-effectiveness of projects approved for India (US $ 12/kg ODP) in this sector and the average cost-effectiveness of all CTC phase-out projects in the solvent sector approved by the Multilateral Fund (US $8.05/kg ODP) were considered. While the cost-effectiveness based on the projects previously approved for India (US $12/kg ODP) seems to be an obvious choice for determining the cost of conversion of the metal cleaning sector in India, the Government of India understands that through this sector plan approach significant economy of scale should be realized. Therefore, it is agreed that the cost-effectiveness of US $8.05/kg ODP be used as a basis for determining the funding level. Based on the US $8.05/kg ODP, the funding request of US $ 14.59 million to phase out the remaining consumption of 1,812 ODP tons in a large number of small CTC users is proposed as part of the CTC phase-out plan. Part of the funding request of US $14.59 million will be used for providing technical assistance to enterprises to identify proper alternatives for their various CTC-using cleaning processes.

132. To reach out to these small CTC users, dealers and distributors of CTC will be requested to assist the Government of India to channel the available financial assistance and information pertaining to the CTC phase-out plan.

Table VII.2 Proposed Funding for Conversion in the Metal Cleaning Applications

CTC Users	ODP tons	Requested Funds (US$)
Four enterprises: Nissan Copper, Western Engineering, Steel Authority of India, and Hindustan Metals and Tubes.	395.33	4,878,061

Small CTC users	1,812	14,586,600
Total	2,207	19,464,661

3. CTC Used as Stain Remover in the Textile Industry

133. Based on the data provided by UNDP, it is estimated that there are about 1,000 export houses and garment factories using CTC as a stain remover. The total CTC consumption for this application is approximately 1,500 MT. Since these users as well as those in the metal cleaning sector are both large in number and scattered over the country, the Government of India is, therefore, proposing a detailed strategy for reaching out to these small enterprises and to channel appropriate assistance to them. The strategy for reaching out these small enterprises is described in detail in the following chapter.

134. This outreach strategy will enable the Government of India to disseminate information pertaining to the global efforts to phase out CTC, the obligations of the Government of India to phase out CTC in accordance with the Montreal Protocol requirements, and commercially available alternatives. However, to adopt these alternatives certain measures to ensure workers' safety must be properly implemented as well.

135. To ensure workers' safety in the textile industry, ventilation systems would have to be installed. Therefore, the Government of India is requesting funding from the Multilateral Fund to provide financial support to cover part of this cost. It is proposing that at a minimum US $500 should be allocated for supporting safe conversion at each enterprise. This funding should be used to acquire blowers and hoods, if the need has been identified during the implementation. Based on this cost estimate, the total funding requirement for this component is US $500,000.

136. To channel assistance to a large number of small CTC users, the Government of India will secure cooperation from CTC dealers and distributors. It is recognized that dealers and distributors can play an important role in identifying users. They have established relationships with users and have a good understanding of users' requirements. Incentive schemes to attract participation of dealers and distributors will be explored. For example, part of the funding to support non-investment component of this plan, Chapter VIII, could be used for subsidizing dealers' and distributors' costs of launching non-CTC alternatives, including training in proper and safe methods for their use. In addition, an incentive scheme, which is a combination of rewards and recognition, as proposed by the Solvent Sector Strategy, could also be considered. The Government of India would also explore possibility of having Textile Association of India take the lead in delivering financial and technical assistance to CTC users in the textile and garment industry.

4. Chemical Solvents

137. The survey identified 26 other pharmaceutical manufacturers that use CTC in their production processes. These applications are not part of Table A of Decision X/14.

However, CTC used by these applications can be considered as a chemical solvent. Therefore, the Government of India would like to request the Multilateral Fund to provide financial assistance to enable these companies to eliminate their use of CTC as part of the CTC phase-out plan for the solvent sector.

138. These applications have been identified recently during the survey conducted as part of the development of this CTC phase-out plan. However, not all applications of CTC are known. Only a few companies already have detailed plans for phasing out CTC either in place or in operation. Technical assistance is definitely required to assist the remaining enterprises to identify alternative chemicals or processes in order to eliminate the use of CTC. Therefore, activities for this sub-sector should include both investment and technical assistance components.

Investment Components

139. The requested funding for the solvent use in the pharmaceutical industry is shown in Table VII.3. Among these enterprises, seven of them have already been able to develop detailed conversion plans and estimate their conversion costs. Detailed conversion plans for these six enterprises are included as Attachment 6 –12. For those whose conversion costs are not available, the proposed funding requests are made on the basis of the overall cost-effectiveness of all previously approved projects for the pharmaceutical sub-sector (US $4.44/kg ODP).

Table VII.3: Requested Funding for the Solvent Use in the Pharmaceutical Industry

Enterprise	**Products**	**MT in 2001**	**ODP tons in 2001**	**Requested Funds (US$)**
Kemix Chemicals	Dexamethasone Phosphate, Betamethasone Phosphate etc.	9.00	9.90	95,714
Nikava Pharmaceuticals		37.60	41.36	223,685
Corvine Chemicals*	Candesartan, Ceftazidime, Indeloxacine, Remoxirpide etc.	28.40	31.24	138,706
Sodium Metal*		62.30	68.53	304,273
Prashanthi Laboratories*		20.00	22.00	97,680
Yenkey Drugs and Pharmaceuticals*		7.00	7.70	34,188
Innova Laboratories	Carbimazole	7.00	7.70	112,983
Leeds Kem	Para Nitro Benzyl Bromide	24.30	26.73	298,097
Panchsheel Organics		22.00	24.20	295,608
Rajesh Chemicals		34.40	37.84	300,991
Saurav Chemicals		60.00	66.00	232,825
Flame Pharmaceuticals*		13.60	14.96	66,422
Dharamasi Morarji Chemicals*	Benzophenone	41.00	45.10	200,244

Avon Organics*	Ethyl 4-Chloro Aceto Acetate	10.00	11.00	48,840
Nitya Pharmaceuticals*	Miscellaneous Applications	6.00	6.60	29,304
Balaji Pharma*		24.00	26.40	117,216
Divis Lab*		18.00	19.80	87,912
Laxmi Agrochemicals*		20.00	22.00	97,680
Fisher Inorganics & Aromatics*		10.00	11.00	48,840
Medo Pharma*		4.00	4.40	19,536
Raj Chemicals*		4.50	4.95	21,978
Trident Healthcare*		7.00	7.70	34,188
Hyderabad Chemicals*		6.00	6.60	29,304
Symed Labs, Hyderabad*		2.00	2.20	9,768
Pearl Organics*		2.10	2.31	10,256
Eupharma Laboratories*		0.90	0.99	4,396

*Requested funds are calculated on the basis of the overall cost-effectiveness of US$ 4.44 /kg ODP, derived from all previously approved projects for the pharmaceutical sector.

140. As pointed out in Table II.2, the total consumption of CTC in the others or miscellaneous applications as estimated by the survey is 380 MT of which, 104.5 MT was reported to be used by companies listed above. Additional efforts would be carried out during the implementation of this CTC phase-out plan to identify users and CTC applications for the remaining consumption of 275.5 MT. Based on the overall cost-effectiveness of US$ 4.44/kg ODP, the Government of India would like to request additional funds of US $1,345,540 to support elimination of this residual CTC consumption.

Technical Assistance Component

141. Two technical assistance activities are required. As pointed out in the earlier chapter, that in addition to these identified enterprises, there are still 275 MT of CTC being consumed by unidentified miscellaneous applications in the pharmaceutical industry. Therefore, the first attempt is to undertake an information campaign on the need to phase out CTC and how to obtain assistance from the Government of India. This activity will be carried out as part of the overall information campaign proposed in the following chapter.

142. The second activity relates to provision of technical assistance to enterprises to identify proper alternative chemicals and processes in order to eliminate the use of CTC. It is envisaged that international experts would probably be required. It is estimated that there could be up to forty enterprises, including the twelve enterprises whose names are included in the list, fall under this miscellaneous application category. Therefore, the Government of India is requesting a lump-sum technical assistance budget of $200,000 to support this required technical assistance activity.

Chapter VIII Technical Assistance to Support CTC Phase-out Plan

1. Introduction

143. To phase out the remaining consumption of CTC in this sector, the CTC phase-out plan is proposing, in addition to the investment activities mentioned above, key non-investment activities to strengthen capacity of the Government of India to effectively address CTC phase-out needs of all CTC consuming sectors including a large number of small CTC users in the solvent sector.

2. Information Exchange

144. There is a significant need for raising awareness regarding the Montreal Protocol and phase-out of CTC particularly in the solvent sector where there are a large number of small CTC users that are scattered across the country. As pointed out in Chapter V, for India to meet its 85% CTC consumption reduction by 1 January 2005 a significant amount of CTC phase-out must be achieved in the solvent sector. Lack of awareness of the country's obligations to the Montreal Protocol and the Government's policy for CTC phase-out could impede the successful phase-out of CTC used in India. In addition, the phase-out plan should not create adverse impact on the industrial and economic growth of the affected sectors and sub-sectors. The above necessitates effective awareness and information exchange programs to ensure that the industry has sufficient time to plan for its phase-out of CTC. This information exchange program should also aim to improve the knowledge of CTC end-users regarding available alternatives that are environmental friendly and do not compromise human safety.

Objective of the Information Exchange Program

145. The focus of the program relates to increasing awareness on:

- CTC phase-out plan and related regulations;
- General knowledge of non-ODS technology options, availability of alternatives and technology transfer for usage of alternatives;
- Participation in phase-out activities including training, information exchange and other awareness raising activities planned in the future.

146. The survey indicates that most enterprises using CTC are not aware of the phase-out deadline or assistance for phasing out CTC that is available through the Multilateral Fund. The survey also found that most enterprises require technical assistance with regard to various alternative technology options including their technical and commercial viability. In addition, there is a need to provide CTC users with proper knowledge on the proper use of alternative cleaning agents that will not create adverse impact to environment and human safety.

3. Awareness Activities

147. Besides media such as print, television, publications, pamphlets, and etc., access to the consumers in the solvent sector will be developed through direct communication to users in the sector. Knowledge updates pertaining to phase-out requirements of CTC in accordance with the proposed CTC phase-out plan, Government interventions, rules and regulations, availability of technical and financial assistance, alternative technologies, and others, will be carried out through the network of industry representatives and associations.

148. Industry associations for the various sub-sectors, such as Confederation of Indian Industries, Textile Association of India, India Machinery Tools Manufacturers Association, Electronic Components Industry Association, Indian Electronic and Electrical Manufacturers Association, All India Plastic Manufactures Association, All India Federation of Plastic Industries, and other relevant trade/professional and non-governmental organizations, will be used for reaching out to their members. The larger associations that exist at a national level will be requested to provide information to smaller sub-sector associations, which could be more effective in targeting smaller enterprises, especially at the regional level.

149. Using the network of dealers that are supplying CTC, to reach out to CTC users was considered. However, this approach is not proposed to be a primary instrument to reach out to a larger number of end-users because the survey results reveal that there is resistance from some dealers or distributors to provide their customers with information related to non-CTC solvents. This situation may change when the restriction of consumption and production of CTC as per the Ozone Rules 2000 starts taking effect on 1 January 2005. These dealers and distributors may look for options for selling non-CTC alternatives. Therefore, incentives such as financial support for part of the costs for launching non-CTC alternatives could be subsidized. Funding to support this component could come from the proposed budget for the awareness building component. In addition, rewards and recognition programs to attract CTC dealers and users would also be explored.

150. A similar effort to involve distributors will be extended to those currently supplying alternatives. They will assist the Government of India to disseminate information regarding their products. These distributors are expected to play a dual role of not only increasing awareness but also ensuring logistics of supply of alternatives and proper usage of alternative technology.

4. Solvent Alternative Technology Services (SATS) Units

151. Solvent Alternative Technology Services (SATS) Units will be set up to provide support to CTC consumers in the solvent sector, mainly for the metal cleaning and textile industries. The support from SATS includes technical and required operational administration to ensure successful conversion to non-CTC technology. A network of experts, distributors, and industry representatives will support these units. The role of

SATS will include identifying CTC consumption with support from the distribution network, to the extent feasible, increasing technology knowledge on the use of alternatives, providing information on availability and access to substitutes, in addition to monitoring and coordination of information exchange activities.

152. Although SATS is designed to assist all CTC users, its primary purpose is to service small enterprises. SATS consists of the following key elements:

- Nine regional Solvent Alternative Technology Services units housed in State level technical institutions or industrial training centers. It is proposed that these nine regional units be established in Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Delhi, Uttar Pradesh, West Bengal, and Madhya Pradesh. These SATSs will carry out the following activities:
    - Knowledge dissemination on non-CTC technology;
    - Technical input on usage of these alternative technologies;
    - Mechanisms for adopting non-ODS alternatives; and,
    - Monitoring and implementing technology transfer activities;
- In addition, SATS will be primarily supported by one or more of the following:
    - Local manufacturers/dealers of non-CTC alternatives; and
    - Experts in the field.

153. SATSs will be involved in development of a promotion and delivery system to reach out to many solvent users that are geographically dispersed throughout the country. Because of the geographical distribution of a large number of small CTC users, SATSs will have mobile units to deliver information on non-ODS alternatives to the doorsteps of small enterprises through road demonstrations. As mentioned earlier, the geographic location of small users though dispersed is found in clusters. High CTC consumption concentration clusters will be targeted by these road shows.

154. The mobile units will be equipped with audio-visual equipment for demonstration purposes on alternative technologies, information brochures relating to non-ODS alternatives and their safe usage, and etc. These units will be attached to a specific SATS. Thus, for nine SATSs, there will be nine mobile units. The technical staff, with proper training on non-ODS alternative technologies, will travel in these mobile units to disseminate information and demonstrate the safe use of alternatives. The mobile units will coordinate their activities with the local CTC consumption centers through industry associations, distributors, industrial development centers, and other relevant bodies, for conducting demonstration and training activities.

155. SATS mobile units will report to the Regional Centers. The Regional Centers will in turn report the outcome of their activities to the Ozone Cell. The report will include the number of training programs conducted in different locations, number of participants, industry structure in the location, and responses from participants.

156. A summary of the main activities that form part of the information exchange program are shown below.

Table VIII.1: List of Main Activities for the Information Exchange Program

Activity	Starting	Coordination	Coverage
Information dissemination in print media to build awareness regarding CTC phase-out dates	2003	PMU	2 - 3 nation-wide announcements
Pamphlets and brochures to sensitise enterprises to CTC phase-out, alternative technology options, good practices, etc.	2003	SATSs	Throughout the first three years.
Technical workshops for the State level technical institutions	2003	PMU and SATSs	Workshops across 16 States during the first year
Road shows by SATSs	2003	SATSs	Major consuming industrial areas for the first three years
Sensitising corporate entities who have CTC users as intermediaries, enterprises and general public through articles in newspapers.	2003	PMU and industry associations	Throughout the first three years.

5. National Awareness Strategy

157. The Government of India has already initiated a nation-wide awareness strategy. The objectives of the awareness strategy include increasing awareness of the Montreal Protocol, increasing awareness regarding ODS and its harmful side effects, ODS rules and regulations. The awareness strategy also aims to provide inputs to stakeholders so that they can manage their phase-out in a cost-effective manner, and to educate stakeholders on their role in phasing out ODS.

158. The CTC phase-out plan proposes to include general awareness regarding usage of the CTC solvent into the existing national awareness strategy. The national awareness strategy is targeting the public on broader parameters including the harmful effects of ODS and depletion of the Ozone Layer, with an aim to influence the public opinion to promote the use of environmental friendly alternatives.

6. Training for Capacity Building in the Solvent Sector

159. The proposed training program will facilitate the switch-over of a large proportion of informal enterprises using CTC in their manufacturing/production process. The target group for training programs is primarily technical institutions and distributors of alternatives. The objective is to have them assist the Government of India to disseminate information and technical information to end-user industry.

160. Given the short timeframe required for switch-over, the technology transfer will be carried out through mobile units under SATSs. The training program is expected to facilitate small CTC users to access information necessary for their conversion process.

161. The major training needs include the following:

- Awareness on the Montreal Protocol with the focus on CTC phase-out requirements;
- Training on alternative technologies available for the solvent applications;
- Safety and good practices in using alternative technologies; and
- Methodologies for effective training and awareness building.

162. The training requirement will vary depending upon the process adopted by enterprises in different sub-sectors. Therefore, there may be some common training modules for all target respondents and differentiated training requirements for alternative technology end-use segments.

163. Since training is required for capacity building over a long term, this activity can be carried out over a period of next two to three years, commencing immediately. As mentioned earlier, the training activities should immediately focus on the large consumption States namely, Tamil Nadu, Maharashtra, Gujarat, Delhi, Karnataka, Kerala, Andhra Pradesh, Madhya Pradesh and Kerala.

164. Technical training is provided by broadly the following five categories of institutions:

- Engineering Colleges and Technical Polytechnics, both Government owned and private.
- ITI and affiliated private training institutions of the DGET, Government of India (2000 in number).
- Small Industries Services Institutes (SISIs) of the DCSSI (about 28 in numbers).
- Private Training Institutes.
- Industries, which are in the business of non-ODS alternatives for the solvent sector.

165. Each of the training institutions caters to certain segments of the trainees. While the Engineering Colleges and Polytechnics cater to the higher end of trainees, the other four cater to a large extent to technicians working with small and informal sector enterprises. DGET plays a leading role in designing courses for these institutions and providing training to the trainees.

166. Apart from these, SATSs will act as knowledge centres for disseminating information relating to the solvent sector. Key technical personnel from SATSs should also be trained to supplement the training provided to the above institutions.

167. In addition, training programs may also cover dealers/distribution networks who are dealing with the solvent industry. This will help improve participation by the distribution network in technology transfer and information dissemination on non-ODS solvent to the user industry.

168. The objective of the training program is to strengthen capacity of local technical institutions on alternative technologies and subsequently to end-user segments that are currently consuming CTC. The following will be underlying principles for training plans for the solvent sector.

- Training should have an immediate focus on awareness building of the ODS phase-out, processes and non-ODS alternatives for specific sub-sectors.

- Training should be designed in such a way that key personnel from large volume consumption States are trained as trainers so that they can carry out training in their respective States.

- For cost effectiveness, training should use existing facilities to the extent possible. Training at SATSs should be used only for the local participants and trainers, who will disseminate the information to the large informal sector.

- Given the short time frame to phasing out CTC in the solvent sector, focus will be more on awareness and building accessible networks, and not on comprehensive training of informal sector.

169. Given the consumption pattern and nature of industrial activities, it is proposed to train personnel from 23 States and Union Territories. The total number of trainees to be trained is estimated to be 550.

170. The training program will be a **three day program** which will primarily include:

- General awareness on Montreal Protocol;
- Consumption of ODS in the solvent sector;
- Alternative technologies for solvent sector conversion;
- Methodology of use and conversion to alternative technologies; and
- Training techniques and methodologies for conducting downstream programs.

171. This training program will include normal classroom sessions and "hand holding" demonstration sessions, to the extent feasible. Visual aids will be used for these training programs for effective communication on alternative technologies.

172. The activities mentioned above will be done in coordination with local technical institutions, local industry associations, dealers of non-ODS and Small Industries Services Institutes (SISIs) in the State. Participation from industries, which have already adopted alternatives, should be encouraged to demonstrate implementation effectiveness.

7. Administrative and Management Support

173. The CTC phase-out plan will be implemented under the direct supervision of MoEF. To strengthen functioning and coordination of the Ozone Cell in the implementation of this CTC phase-out plan, a small management unit will be established as an annex to the existing Project Management Unit (PMU) for the CFC production closure project. This management unit will be part of the existing society and be governed by the rules of the society.

174. The management unit will be responsible for coordinating implementation of all investment and non-investment activities proposed under the CTC phase-out plan for both the consumption and production sector activities. Its role and responsibilities are described as follows in Paragraphs 175 and 176:

175. Roles and Responsibilities – The role of the management unit entails development of detailed implementation plan and overall monitoring and supervision of the CTC phase-out plan. Details of list of activities under the responsibility of the management unit are given below:

- Preparation and implementation of the annual programs for the CTC phase-out plan;
- Identification and assistance in the design of sub-projects for the CTC phase-out plan;
- Monitoring and supervision of project implementation at national level including coordination of independent verification of the ODS phase-out by the beneficiary enterprises;
- Information exchange support to the Ozone Cell, regional centers and beneficiary enterprises;
- Periodic assessment of the alternatives supply situation and provide inputs as well as possible interventions, if required, to the Ozone Cell on the same;
- Support implementation of information exchange and training activities;
- Maintenance of database and relevant records related to the CTC phase-out plan; and
- Monitoring impact of activities implemented.

176. The inter-linkages that will be established by the management unit with other key stakeholders are given below:

- Coordinate with industry and industry representatives on activities relating to monitoring and implementation of CTC phase-out;
- Coordinate with implementing agencies on CTC phase-out matters especially preparation of Annual Plan and Review Mission activities;
- Coordinate with the Ozone Cell and report to Director of the Ozone Cell on CTC phase-out related activities and identification of interventions; and
- Coordinate and supervise the functioning of the Regional centers for implementation of CTC phase-out activities.

8. Management Information System (MIS) Development

177. Design and development of the CTC Phase-out Management Information System is critical to the effective supervision and monitoring implementation of activities to be undertaken according to this plan.

178. MIS will be developed to track progress of the Annual Programs and overall CTC phase-out, including investment and non-investment activities. The MIS will be designed to allow the management unit to use it as the main tool for project monitoring and disbursements, performance audits of the CTC producing enterprises, generating progress reports and impact analysis. Once established, the MIS design will evolve and be revised as needed, based on project implementation experiences and evolving needs for reporting.

179. The MIS will contain information on the following aspects of the project:

- Overall project indicators at the national level, including the base-line CTC consumption level, the national phase-out schedule agreed under the project and annual national phase-out targets;

- Investment and TA activities, including descriptions of each activity, TORs for consultants, budget and time estimates, implementation progress and outputs including information on set up of training centres, “no clean” technology, non-ODS alternatives, etc;

- Status of implementation of awareness programs, training programs, and other investment components;

- Promulgation, implementation status, and effectiveness of other relevant policies and regulations, including the ODS (Regulation) Rules, and development of any new policies and regulations relevant to the project; and

- Financial information for the TA component, and for the enterprise compensation component, including the date and amount of disbursements to each grant beneficiary.

180. The proposed budget for the non-investment component is shown in Table VIII.2.

Table VIII.2: Proposed Budget for the Non-Investment Component of the CTC Phase-out Plan

Particulars for the period 2003-2010	**USD**
Staff and experts for project	350,000
Operating cost (e.g. travel, per diem, utilities)	262,500
One time start up cost	50,000
Sub total	**662,500**
Performance audits for producers and related quota adherence	146,000
Awareness building	210,000
Training for capacity building of technical institutions	92,000
Solvent Alternative Technology Services including mobile units	452,000
MIS development	31,250
Periodic Market Assessment of Alternatives and Impact	125,000
Contingencies	105,625
Sub total	**1,161,875**
Total	**1,824,375**

181. The requested funding shown above will be utilized for the operation of the management unit for a period of seven years.

CHAPTER IX OPERATING MECHANISMS

1. Introduction

182. The Government of India and the World Bank envisage that the following procedures for establishing funding arrangements and operating mechanisms for project management, coordination, supervision and evaluation as well as responsibilities of various institutions would be considered and further refined during the implementation of the CTC phase-out plan.

2. Umbrella Grant Agreement

183. India and the World Bank will sign an Umbrella Grant Agreement, which sets forth terms and conditions under which grant resources approved by the Executive Committee for the CTC production and consumption phase-out plan in India would be carried out. This agreement includes provisions that allow the Bank to disburse funds to India on performance-based indicators in terms of ODS phase-out. This Umbrella Grant Agreement will accommodate the implementation of the CTC phase-out plan, which will entail CTC phase-out in both the consumption and production sectors. The Grant Agreement will include provisions for any flexibility, to be agreed to by the Executive Committee, for the Government of India to utilize the approved funds in order to achieve its compliance and the agreement for this CTC phase-out plan. However, any modifications made to the CTC phase-out plan including resource allocations, will be reflected in the annual plans to be submitted to the Executive Committee of the Multilateral Fund.

3. Funding Arrangements

184. Multilateral Fund Approval: It is anticipated that funds for the CTC phase-out plan would be approved in two steps:

185. Firstly, the Government of India, through the World Bank, will request that the Executive Committee consider this overall CTC phase-out plan and agree to fund the phase-out in accordance with the cash-flow as proposed in Chapter X. At the same time, the Government also requests that the funding for 2003 be released to India upon the Executive Committee's approval of this CTC phase-out plan. For 2004 onwards, annual programs for the following years will be submitted to the first meeting of the Executive Committee of the year in which the annual programs are related to.

186. Annual programs will set out the annual CTC phase-out targets and funding requests. The amount of annual funding request will be consistent with the funding amounts indicated in the CTC phase-out plan. The Executive Committee will be requested to release funds at the levels agreed to in the CTC phase-out plan based on achievement of previous phase-out targets, so that the next annual program could start in the following January. In general, approval of funds would be based on achievement of agreed CTC phase-out targets.

187. In case India fails to reach the phase-out targets for a given year, i.e., if the amount of CTC production or consumption exceeds the agreed targets, the Bank and India will agree on remedial actions before applying for the next year's funding. The remedial actions proposed are to bring the program back on track in the coming year. These remedial actions would be subject to the approval of the Executive Committee. Other conditions as stated in the Umbrella Grant Agreement also apply.

188. The Annual Program would contain the following sections:

1.) Sector phase-out schedule, including phase-out activities, enterprises involved, phase-out approaches adopted and the phase-out timetable;
2.) Status of all activities of previous year(s) and any agreed remedial actions if necessary, for the current year;
3.) Objectives of following year's Annual Program – phase-out targets and funding requirements for activities in the following year;
4.) Description of activities in the subsequent year's Annual Program, including phase-out activities for the enterprise involved, any new policies to be taken up, and technical assistance activities; and
5.) Performance indicators of the Annual Program.

189. The World Bank would approve the technical assistance (TA) consistent with the Annual Program based on agreed Terms of Reference (TOR) for each TA (including the funding level of TA) in that year's Annual Program.

4. Disbursement Mechanism

190. Multilateral Fund Disbursement to the World Bank – The Multilateral Fund will disburse grant funds to the World Bank upon approval of the Annual Program by the Executive Committee. The funds will be transferred to the World Bank account.

191. World Bank Disbursement to India – There would be four disbursements into the ODS Phase-out Account at the financial intermediary appointed by MoEF. The financial intermediary, with MoEF's concurrence, would be allowed to request these four disbursements at any time during the year, provided that the disbursement conditions have been met. In any particular year, disbursement to India will start only when the Bank receives grants for the Annual Program from the Multilateral Fund. Disbursement conditions and amounts to be disbursed are as follows:

1.) *First Disbursement* – Funds for technical assistance and associated financial intermediary fees.
    Condition – Approval of the Annual Program by the Executive Committee and release of funding to the World Bank.

2.) *Second Disbursement* – 50% of funds allocated for investment/enterprise activities and 50% of the financial intermediary fees.

Conditions –

a.) 30% of all CTC reduction agreements covering the target phase-out amounts of the current year's Annual Program have been obtained by the Government;
b.) Progress report on the CTC phase-out plan implementation is satisfactory to the Bank; and
c.) Any other conditions as specified in the current Annual Program have been met.

3.) *Third Disbursement* – 30% of funds allocated to investment/enterprise activities and 30% of financial intermediary fees.

Conditions –

a.) 100% of all reduction agreements covering the phase-out targets and TA contracts of the current year's Annual Program have been obtained;
b.) A progress report for the CTC phase-out plan is provided to the Bank. The progress report is satisfactory to the Bank;
c.) Any other conditions as specified in the current Annual Program are met.

4.) *Fourth Disbursement* – 20% of funds allocated to investment/enterprise activities and 20% of financial intermediary fees.

Conditions –

a.) Performance audit of the previous year's Annual Program is acceptable to the Bank;
b.) Progress report for the implementation of the CTC phase-out plan is satisfactory to the Bank; and
c.) Any other conditions as specified in the current Annual Program are met.

192. In the event that any phase-out targets are not met, the Bank will suspend further disbursement to India. Disbursement will resume only after India and the Bank agree on remedial actions.

193. Allocation of Funds to CTC Consuming/Producing Enterprises for Phase-out Activities – The grant fund will be allocated to enterprises through administrative measures. Selection of enterprises for the first Annual Program will be carried out as soon as possible after the Executive Committee's approval of the CTC phase-out plan. Selection of enterprises in subsequent years will be concluded after the Executive Committee approves the following year's Annual Program and its associated funding level. Selected enterprises would sign CTC reduction agreements with MoEF. The agreements will stipulate, among others, date and amount of CTC phase-out, and the list of equipment to be disposed of and the agreed disposal dates, if applicable.

5. Management and Coordination

194. The Government of India will be responsible for implementing the CTC phase-out plan. To strengthen capacity of the Government of India to undertake a series of activities required to achieve permanent phase-out of CTC, a small management unit with a high degree of decentralization to ensure maximum coverage of all residual CTC users, will be established. It is proposed that funding required to support operations of this proposed unit be requested from the Multilateral Fund.

195. The management unit will be attached to the existing Project Management Unit (PMU) for the CFC production closure project. This management unit will be part of the existing society and be governed by the rules of the society. Role and responsibilities of this proposed management unit are described in Chapter VI.

196. Upon approval of the CTC phase-out plan and the release of the first tranche of funding, the management unit will be established. To proceed with the CTC phase-out in identified CTC users in all sectors, the management unit will advertise and promote the availability of the resources provided by the Multilateral Fund and the Government's policy as laid out in the CTC phase-out plan. These promotional activities will be undertaken in a form of workshops, national newspapers and trade magazines. Enterprises consuming CTC will be invited to attend the project preparation workshops. At these workshops, the management unit will provide training to enterprise(s), or blocks of enterprises using CTC for the same application, on how to prepare project proposals. Prior to these workshops, the management unit will prepare a project proposal template. The template should include a description of each piece of equipment (to be replaced or retrofitted) with serial number and year of installation. Also, the template should include a destruction method and destruction schedule for each piece of equipment to be destroyed and replaced. The pro-forma project proposal should require sufficient information to ensure verification of CTC consumption/production before and after conversion or closure takes place. Disbursement to enterprises should base on enterprises' achievement with respect to the agreed performance target (i.e. CTC reduction targets).

197. For enterprises that require technical assistance to identify suitable non-CTC alternatives, they should submit their request to the management unit. Sector experts would be hired, as appropriate, by the management unit to assist the enterprises in selecting appropriate alternative technologies. Sector experts skilled in the drafting of equipment bid specifications and bid analyses would also be made available, as appropriate.

198. All enterprises are invited to submit requests for funding in line with the MLF guidelines. Funding priority will be given to the most cost-effective proposals. In case phase-out costs requested by the enterprises exceed the funding approved by the MLF, funding will be capped at the average level of cost-effectiveness of previously MLF approved projects in respective sectors or sub-sectors. In case there are savings, the

remaining funds will be used for financing additional enterprises that are not included in this plan, or be used for financing part of the phase-out costs that exceed the average level of cost-effectiveness of previously MLF approved projects, or other activities that deem necessary for ensuring sustainable CTC phase-out.

199. Enterprises are required to submit their proposals before the end of June 2004. Funding priority should be given to enterprises that were established before July 1995. After the deadline for submission of proposals, if the total funding request for all eligible projects is less than the amount approved, savings can be used for assisting those enterprises established after July 1995.

200. Each enterprise is required to provide detailed information regarding baseline conditions and CTC consumption/production. Before signing agreements, information provided by enterprises will be verified by the management unit.

6. Monitoring and Evaluation

201. The management unit is the core team for monitoring the implementation of the CTC phase-out annual program with responsibility of reporting to the World Bank. The financial intermediary will oversee the progress of the CTC phase-out plan for selected enterprises, and submit written reports to the management unit on a quarterly basis. The management unit will also be responsible for tracking the implementation of policy measures and the technical assistance activities. The management unit will submit progress reports to the Bank every quarter. The management unit will also report on specific issues if requested. The implementation status of all activities in annual programs will be reported to the Executive Committee once a year during preparation of following year's annual program, and at other times if specifically requested.

202. Verification – The World Bank will conduct an independent verification annually to verify activities related to CTC phase-out in the consumption and production sectors. The Bank will supervise the implementation of Annual Programs and will have access to any on-going or completed enterprises for spot checks of the records of projects, including random factory visits. The Bank will also carry out such additional verifications as required by the Executive Committee.

203. Audit – There will be (a) an annual financial audit of the CTC phase-out plan account at the financial intermediary, conducted by an independent audit agency acceptable to the Bank, and (b) a performance audit, also by an independent audit agency acceptable to the Bank.

CHAPTER X REQUESTED MLF SUPPORT FOR THE CTC PHASE-OUT PLAN

1. Introduction

204. The proposed funding requests presented in this Chapter are only applicable to eligible CTC phase-out activities in the consumption sector. Additional costs to enable the Government of India to address CTC phase-out in the production sector will be presented at a later stage. In the meantime, only a background note for the CTC phase-out in the production sector is attached.

2. Requested MLF Support for the CTC Phase-out Plan – Consumption

Table X.1: Proposed Funding Request for the CTC Phase-out Plan – Consumption

Activity	ODP tons	C.E. US$/kg ODP	Requested Fund (US$)	Remark
Process Agents				
Chlorinated Rubber Plan	229	18.91	4,330,000	Agreed in principle
Chlorinated Paraffin	199	5.73	1,140,843	Agreed in principle at the 39th Meeting.
Pharmaceutical Applications				
Dr. Reddy's Lab*	28.6	9.09	260,000	CE is in line with Dec. 32/60
Kairav Chemicals	523.16	10.01	5,236,830	Based on CE of US$ 9.10/kg ODP
Unilab Chemicals & Pharmaceuticals	44.11	4.44	195,848	Based on CE of US$ 4.44/kg ODP
Alliance Laboratories	1.32	4.44	5,861	Based on CE of US$ 4.44/kg ODP
Micals Pharma	4.62	4.44	20,513	Based on CE of US$ 4.44/kg ODP
Sub-Total	601.81		5,719,052	
Agro-Chemical Applications				
E.I.D. Parry (India)	137.5	0.98	134,750	Based on CE of US$ 0.98/kg ODP
Hindustan Insecticides	76.09	4.15	315,774	Based on CE of US$ 4.15/kg ODP
Sub-Total	213.59		450,524	
Solvent Sector				
Chemical Solvent				
Kemix Chemicals	9.9	9.67	95,714	See Attachment 6
Nikava Pharmaceuticals	41.36	5.41	223,685	See Attachment 7

Corvine Chemicals	31.24	4.44	138,706	Based on CE of US$ 4.44/kg ODP
Sodium Metal	68.53	4.44	304,273	Based on CE of US$ 4.44/kg ODP
Prashanthi Laboratories	22	4.44	97,680	Based on CE of US$ 4.44/kg ODP
Yenkey Drugs and Pharmaceuticals	7.7	4.44	34,188	Based on CE of US$ 4.44/kg ODP
Innova Laboratories	7.7	14.67	112,983	See Attachment 8
Leeds Kem	26.73	11.15	298,097	See Attachment 9
Panchsheel Organics	24.2	12.22	295,608	See Attachment 10
Rajesh Chemicals	36.74	8.19	300,991	See Attachment 11
Saurav Chemicals	33.99	6.85	232,825	See Attachment 12
Flame Pharmaceuticals	14.96	4.44	66,422	Based on CE of US$ 4.44/kg ODP
Dharamasi Morarji Chemicals	45.1	4.44	200,244	Based on CE of US$ 4.44/kg ODP
Avon Organics	79.2	4.44	351,648	Based on CE of US$ 4.44/kg ODP
Nitya Pharmaceuticals	6.6	4.44	29,304	Based on CE of US$ 4.44/kg ODP
Balaji Pharma	26.4	4.44	117,216	Based on CE of US$ 4.44/kg ODP
Divis Lab	19.8	4.44	87,912	Based on CE of US$ 4.44/kg ODP
Laxmi Agrochemicals	22	4.44	97,680	Based on CE of US$ 4.44/kg ODP
Fisher Inorganics & Aromatics	11	4.44	48,840	Based on CE of US$ 4.44/kg ODP
Medo Pharma	4.4	4.44	19,536	Based on CE of US$ 4.44/kg ODP
Raj Chemicals	4.95	4.44	21,978	Based on CE of US$ 4.44/kg ODP
Trident Healthcare	7.7	4.44	34,188	Based on CE of US$ 4.44/kg ODP
Hyderabad Chemicals	6.6	4.44	29,304	Based on CE of US$ 4.44/kg ODP
Symed Labs, Hyderabad	2.2	4.44	9,768	Based on CE of US$ 4.44/kg ODP
Pearl Organics	2.31	4.44	10,256	Based on CE of US$ 4.44/kg ODP
Eupharma Laboratories	0.99	4.44	4,396	Based on CE of US$ 4.44/kg ODP
Small CTC Users in	303.05		1,345,540	Based on CE of US$

Pharmaceutical Industry		4.44		4.44/kg ODP
Sub-Total	867.35		4,608,982	
Metal Cleaning				
Nissan Copper Pvt. Ltd.	99	9.96	986,177	See Attachment 2
Western Engineering Ltd.	38.5	13.27	510,724	See Attachment 3
Steel Authority of India Ltd.	205.03	14.12	2,894,460	See Attachment 4
Hind Metals and Tubes	52.8	9.22	486,700	See Attachment 5
Small CTC Users in Metal Cleaning	1,812	8.05	14,586,600	Based on CE of US$ 8.05/kg ODP
Sub-Total	2,207.33		19,464,661	
Textile Industry				
Ventilation Equipment for Textile Industry	1,650	0.30	500,000	Based on US$ 500 per company
Sub-Total	1,650		500,000	
Technical Assistance				
Technical Assistance for Process Agents: Pharmaceutical Industry			40,000	New Request
Technical Assistance for Process Agents: Agro-Chemical Industry			15,000	New Request
Technical Assistance for Solvent Sector: Pharmaceutical Industry			200,000	New Request
Management, Public Awareness, Training, Technology Transfer			1,824,375	New Request
Sub-Total			2,079,375	New Request
Total	5,968		38,293,437	

3. Overall Cost-Effectiveness of the CTC Phase-out Plan - Consumption

205. The proposed funding request of US$ 38,293,437 will be used for phasing out 5,968 ODP tons of CTC. This CTC phase-out plan with projects previously approved by the MLF will enable the Government of India to phase out the total remaining CTC consumption of 6,662 ODP tons in 2001. Based on the phase-out strategy proposed in Chapter V, India will be able to meet the 85% consumption reduction target in 2005 and complete phase-out in 2010.

206. The overall cost-effectiveness of the proposed CTC phase-out plan is US$6.42 /kg ODP.

CHAPTER XI PHASE-OUT SCHEDULE AND RESOURCE REQUIREMENTS

1. Introduction

207. This Chapter presents the phase-out schedule in line with the strategy proposed in Chapter V, including annual phase-out targets. This is a rolling plan where the impact of an annual program can be spread over subsequent years. Every annual program will provide detailed progress of all program activities of previous years, including policy implementation, enterprise activities, and technical assistance activities.

2. CTC Consumption Phase-out Schedule

208. The proposed CTC phase-out schedule for the consumption sector is presented as follows.

Table XI.1: CTC Consumption Phase-out Schedule[10] from 2003 to 2010 (MT)

	Baseline (2001)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Consumption Target (MT)	6,056	1,543	1,043	643	243	43	-
Phase-out Target for Sector Plan (MT)	6,056	4,513	500	400	400	43	-

[10] CTC used for feedstock and exempted are not part of this CTC phase-out plan.

3. Cash-Flow for the CTC Phase-out Plan – Consumption

Table XI.2: Cash-Flow

Description	Total Request (US$)	2003	2004	2005	2006	2007	2008	2009
Investment Activities								
Process Agents Sector								
Chlorinated Rubber	4,330,000	4,330,000						
Chlorinated Paraffin	1,140,843	1,140,843						
Pharmaceutical Applications	5,719,052	5,123,873						
Agro-Chemical Applications	450,524	450,524						
Solvent Sector								
Chemical Solvent	4,608,982	1,200,000	3,408,982					
Metal Cleaning	19,464,661	5,000,000	5,600,000	2,400,000	1,800,000	1,800,000	1,800,000	1,064,661
Textile Industry	500,000	50,000	300,000	100,000	50,000			
TA Component	2,079,375	815,490	210,650	210,650	210,650	210,650	210,650	210,635
Sub-total	38,293,437	18,705,909	9,519,632	2,710,650	2,060,650	2,010,650	2,010,650	1,275,296
Agency Support Cost	2,872,008	1,402,943	713,972	203,299	154,549	150,799	150,799	95,647
Total	41,165,445	20,108,852	10,233,604	2,913,949	2,215,199	2,161,449	2,161,449	1,370,943

CHAPTER XII AGREEMENT BETWEEN THE EXECUTIVE COMMITTEE AND THE GOVERNMENT OF INDIA FOR THE CTC PHASE-OUT PLAN

[To be inserted]

ANNEX I
BACKGROUND NOTE FOR THE CTC PRODUCTION PHASE-OUT PLAN

Introduction

209. The Montreal Protocol on Ozone Depleting Substances requires that countries operating under Article 5, paragraph 1 of the Protocol, shall reduce their production of CTC for non-feedstock applications by 85% of the baseline production level (1998 – 2000) by 1 January 2005 and 100% by 1 January 2010. However, to meet the basic domestic needs of other Article 5 countries additional production up to 10% of the baseline production level is allowed from 1 January 2005 to 31 December 2009.

Sector Background

210. India is one of the few Article 5 countries that produces CTC. There are three active CTC producers in India. These are Gujarat Alkalies and Chemicals Limited (GACL), Chemplast Limited and SRF Limited. In addition, there are two CTC plants which have ceased production. These are: National Rayons, which has dismantled its production capacity and Sriram Rayons, which is dormant. The installed capacity of the three producing facilities is shown in Table 1.

Table 1: Installed Capacity of Existing CTC Production Facilities

	GACL	Chemplast	SRF	Total
Installed Capacity (MT)	21,120	22,000	22,550	65,670

Data subject to Audit verification

211. The three manufacturers employ different chemical production processes. GACL uses the chlorination of methane as its process for producing CTC while Chemplast uses the thermal chlorination process and SRF produces CTC by photo-chlorination of methanol. These processes generate not only CTC but also methylene chloride and chloroform as co-products. Among other possible uses, methylene chloride has been used in many occasions as an alternative to CFC-11 as a blowing agent for flexible foam. Chloroform is being used as a raw material for production of HCFC-22.

212. Since all the three products manufactured by these enterprises have commercial values and their demand is growing, any variations in the level of CTC production could affect the supply of co-products. At present, these products are typically produced by the following ratio: 30% CTC, 40% methylene chloride, and 30% chloroform. The production ratio could vary depending on the market demand. However, due to the technical limitation of the production processes, the production level of CTC could not be lower than 20%.

Factors Determining Compensation Level for CTC Producers

213. It is important to point that the major demand for CTC is in the manufacturing of CFC. CTC is used as feedstock for the production of CFC. Historically, CFC producers obtain their supply of CTC from both domestic and international markets. Since the international price of CTC is lower than the cost of CTC produced in the domestic market, CTC producers normally import CTC for producing CFC for the export market. CTC imported for production of export products are not subject to import duties. Similarly, other industries that require CTC for production purposes, also source their supply of CTC from both the domestic and international markets. The decision of CTC producers to produce CTC is, therefore, influenced by the decisions of CFC producers and other CTC-consuming industries. In addition, due to the constraints with regard to the product mix, the decision of CTC producers may also be affected by the demand and profit margins for the co-products.

214. Unlike the Montreal Protocol's requirement for CFC phase-out, CTC used as feedstock is not considered as a controlled substance under the Montreal Protocol. Therefore CTC can be produced and consumed for feedstock applications and other applications exempted by the Parties even after 2010. The future demand of these applications is, therefore, another important factor for determining the net economic or financial impact to India and its related industry.

215. To accurately cost out the compensation level for CTC producers without fully understanding the interplay of different factors mentioned above, is not possible and could deprive India and its industry of their eligible compensation from the Multilateral Fund. This critical issue was, in fact, observed by China when its process agents sector plan was approved at the 38th Meeting of the Executive Committee in Rome in 2002. Part of the funding approved by the Multilateral Fund to support CTC production phase-out in China includes those CTC production facilities that produce only CTC. The approved sector plan does not cover CTC producing facilities that produce both CTC and co-products.

Proposed Approach

216. The Bank is in the process of developing a supply-demand model for CTC and its co-products to accurately determine the compensation level for the CTC producers. This is to be done on the basis of a supply and demand model, which will review different CTC phase-out scenarios, while analyzing existing pricing and regulatory frameworks, institutional and financial barriers and economic distortions and existing gaps. To ensure that this supply-demand model accurately reflects the nature of the market forces for CTC its co-products, all critical economic information is being compiled. Until full understanding of these economic factors is available, it is not possible to determine, with any degree of confidence, the level of funding for the CTC production phase-out.

217. It is also important to note that to request funding for projects in the production sector, a technical audit commissioned by the Executive Committee of the Multilateral

Fund must be carried out, which provide the basic information required on eligible incremental costs. The technical audit for India is still in process and the report has not yet been finalized.

ANNEX II
List of CTC Distributors

Sr. No.	Dealer Name	Location	Source
1	B. S. Mehra Sons Pvt. Ltd	New Delhi	CHEMPLAST SANMAR
2	EnnGees Pharma	New Delhi	CHEMPLAST SANMAR
3	Pankaj Chemical Company	New Delhi	CHEMPLAST SANMAR
4	Bahubali Dye Ltd	New Delhi	GACL
5	Punjab Chemicals Agency	New Delhi	GACL
6	Sultanchand Bimaprakas	New Delhi	GACL
7	Suresh Trading Company	New Delhi	GACL
8	BK Sales Corporation	New Delhi	SRF LTD
9	P D Polychem Pvt. Ltd	New Delhi	SRF LTD
10	Rajiv Traders	New Delhi	SRF LTD
11	Perfect Chem	New Delhi	SRF LTD
12	Lalji Lakhamshi Chemicals (P) Ltd	Mumbai	CHEMPLAST SANMAR
13	Pharma Chemical	Mumbai	CHEMPLAST SANMAR
14	Chem Mart	Mumbai	GACL
15	Crescent Chemicals	Mumbai	GACL
16	Heetu Chemicals & Alk. P. Ltd	Mumbai	GACL
17	Jay Ami Polymers P. Ltd	Mumbai	GACL
18	R. R. Enterprises	Mumbai	GACL
19	Sovika	Mumbai	GACL
20	Sumex Organics Ltd	Mumbai	SRF LTD
21	Daga Petrochemicals Ltd	Mumbai	SRF LTD
22	Krishnaswamy & Co	Solapur	CHEMPLAST SANMAR
23	Jain Acid & Chemicals	Nagpur	GACL
24	Prashanth Enterprises	Pune	CHEMPLAST SANMAR
25	Chemical People	Pune	GACL
26	STS Chemicals Ltd	Pune	GACL
27	SVS Chemicals Corporation	Pune	GACL
28	Gajalakshmi (Bangalore) Dyes & Chemicals	Bangalore	CHEMPLAST SANMAR
29	Sreenathji Chemical Industries	Bangalore	SRF LTD
30	Mahan Dye Chem	Bangalore	GACL
31	Gemini Chemisols	Bangalore	SRF LTD
32	Daga Petrochemicals Ltd	Andhra Pradesh	SRF LTD
33	S.S.B. Sales	Andhra Pradesh	SRF LTD
34	Gowra Petro Chem Pvt. Ltd	Andhra Pradesh	CHEMPLAST SANMAR
35	Ramnath & Co. Pvt. Ltd	Secunderabad	GACL

36	Mettur Agencies	Tamilnadu	CHEMPLAST SANMAR
37	Prabha Agency	Tamilnadu	CHEMPLAST SANMAR
38	Ashoka Marketing Agenices	Tamilnadu	SRF LTD
39	Super Chemical Traders	Coimbatore	CHEMPLAST SANMAR
40	T. K. Pattabiraman	Coimbatore	CHEMPLAST SANMAR
41	Ram Nath & Co. Pvt. Ltd	Coimbatore	GACL
42	V. N. Ayyadurai	Erode	CHEMPLAST SANMAR
43	Ramnath & Co. Pvt. Ltd	Chennai	GACL
44	Pon Pure Chem (P) Ltd	Chennai	GACL
45	Gajalakshmi Dyes & Chemicals	Chennai	CHEMPLAST SANMAR
46	Ruby Chemicals	Indore	CHEMPLAST SANMAR
47	Kavita Enterprise	Indore	GACL
48	Kukreja Industries	Bhilai (M.P.)	GACL
49	S.V.K.Iyer & Co.	Tirupur	CHEMPLAST SANMAR
50	Sterling Chemicals & Plastics	Kerala	CHEMPLAST SANMAR
51	Vauman Agencies	Kolkata	CHEMPLAST SANMAR
52	Pharmachem Traders	Kolkata	GACL
53	Daga Petrochemicals Ltd	Kolkata	SRF LTD
54	Impex Chemicals	Baroda	GACL
55	Prakash Chemicals	Baroda	GACL
56	Purvi Chemicals	Baroda	GACL
57	Subuchi Chemicals	Baroda	GACL
58	Crescent Chemicals	Baroda	GACL
59	Gaekwad Marketing Pvt. Ltd	Baroda	GACL
60	Heetu Chemicals & Alk. P. Ltd	Baroda	GACL
61	Suruchi Chemicals	Baroda	GACL
62	Pragati Progressives Pvt. Ltd	Baroda	GACL
63	Jay Dyes & Chemicals	Ahmedabad	GACL
64	Oscar Chemicals Pvt. Ltd	Ahmedabad	SRF LTD
65	Jay Ami Polymers P. Ltd	Ahmedabad	GACL
66	Popatlal Amthalal Shah	Ahmedabad	GACL
67	Agrawal Agencies	Ahmedabad	GACL
68	Krishna Enterprise	Rajkot	GACL
69	NN Patel	Rajkot	GACL
70	Nazarally Noorbhai Patel	Rajkot	GACL
71	M. J. Corporation	Vapi	GACL
72	Deviyani Tex-Chem P. Ltd	Surat	GACL
73	Shiv Corporation	Bharuch	GACL

74	Korchems	Ankleshwar	GACL
75	Paramount Chemicals Corporation	Punjab	SRF LTD
76	Guljag Industries Ltd	Jodhpur	GACL
77	Cosmos Processors	Orissa	GACL
78	Golchha Enterprise	Jamshedpur	GACL

Annex III
Table A: List of uses of controlled substances as process agents

No.	Substance	Process agent application
1	CTC	Elimination of NCl_3 in the production of chlorine and caustic
2	CTC	Recovery of chlorine in tail gas from production of chlorine
3	CTC	Manufacture of chlorinated rubber
4	CTC	Manufacture of endosulphan (insecticide)
5	CTC	Manufacture of isobutyl acetophenone (ibuprofen – analgesic)
6	CTC	Manufacture of 1-1, Bis (4-chlorophenyl) 2,2,2-trichloroethanol (dicofol insecticide)
7	CTC	Manufacture of chlorosulphonated polyolefin (CSM)
8	CTC	Manufacture of poly-phenylene-terephtal-amide
9	CFC 113	Manufacture of fluoropolymer resins
10	CFC 11	Manufacture of fine synthetic polyolefin fiber sheet
11	CTC	Manufacture of styrene butadiene rubber
12	CTC	Manufacture of chlorinated paraffin
13	CFC 113	Manufacture of vinorelbine (pharmaceutical product)
14	CFC 12	Photochemical synthesis of perfluoropolyetherpolyperoxide precursors of Z-perfluoropolyethers and difunctional derivatives
15	CFC 113	Reduction of perfluoropolyetherpolyperoxide intermediate for production of perfluoropolyether diesters
16	CFC 113	Preparation of perfluoropolyether diols with high functionality
17	CTC	Production of pharmaceuticals – ketotifen, anticol and disulfiram
18	CTC	Production of tralomethrine (insecticide)
19	CTC	Bromohexine hydrochloride
20	CTC	Diclofenac sodium
21	CTC	Cloxacilin
22	CTC	Phenyl glycine
23	CTC	Isosorbid mononitrate
24	CTC	Omeprazol
25	CFC 12	Manufacture of vaccine bottles

ANNEX IV
CTC CONSUMPTION IN THE PROCESS AGENTS SECTOR

A	PROCESS AGENTS SECTOR - CHLORINATED RUBBER				
A1	**Chlorinated Rubber**	**2000-2001 (MT)**	**1999-2000 (MT)**	**1998-1999 (MT)**	**1997-1998 (MT)**
a)	Pauraj Chemicals Pvt. Ltd.	10.00	35.90	36.00	49.00
b)	Rishiroop Organics Pvt. Ltd.	69.00	122.61	196.00	221.00
c)	Rishiroop Polymers Pvt. Ltd.	0.00	0.00	0.00	0.00
d)	Rishiroop Rubber International Ltd.	130.00	352.52	346.00	456.00
e)	Tarak Chemicals Ltd.	68.00	38.00	24.00	0.00
	Sub Total A1	277.00	549.03	602.00	726.00
CHLORINATED RUBBER TOTAL		277.00	549.03	602.00	726.00
B	**PROCESS AGENTS SECTOR - AGRO CHEMICALS**				
B1	**Endosulfan**				
a)	E.I.D. Parry (India) Ltd.	125	140	180	215
b)	Excel Industries Ltd.	139	384	435	335
	Sub Total B1	264	524	615	550
B2	**Dicofol**				
a)	Hindustan Insecticides Ltd.	69.17	71.06	51.31	99.34
	Sub Total B2	69.17	71.06	51.31	99.34
AGRO CHEMICALS TOTAL (B1 + B2)		333.17	595.06	666.31	649.34
C	**CHLORINATED PARAFFIN 70 % SOLID GRADE**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Kedia Organic Chemicals Pvt. Ltd.	181	179	155.8	0
	CHLORINATED PARAFFINS TOTAL	181	179	155.8	0
D	**PROCESS AGENTS SECTOR - PHARMACEUTICALS**				
D1	**Ibuprofen (4 ISOBUTYLACETOPHENONE)**				
a)	C- Well Drugs Ltd.				
b)	Cheminor Drugs				
c)	Chiplun Fine Chemicals Ltd.	15.2	15.2	3.3	3.3
d)	Doctor's Organic Chemicals Ltd.	35	35	73	150
e)	EMGI Pharmaceuticals & Chemicals Pvt Ltd				
f)	Global Bulk Drugs				
g)	Global Drugs Ltd.	0	0	0	100
h)	Satwik Drugs Ltd.	0	0	0	100
i)	Satyadeeptha Pharmaceuticals Ltd.	41.5	41.5	21.5	13.1
j)	Sekhsaria Chemicals				
k)	Shashun Drugs Ltd.				
l)	Svis Labs	51.2	51.2	64.9	31.6
m)	Dr Reddy's Lab	26	26	26	26
	Sub Total D1	168.9	168.9	188.7	424
D2	**Bromohexine Hydrochloride (2 NITRO BENZYL BROMIDE)**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	IPCA Laboratories Ltd.				
b)	Benzo Chemical	25	19.8	18	18
c)	FDC Ltd	42	31.5	19.5	19.5
d)	GRD Chemicals Ltd.	21	16.5	11.3	11.3
e)	Pradeep Shetye	125	118	122	122
	Sub Total D2	213	185.8	170.8	170.8

D3	**Phenyl Glycine**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Alpha Drugs Ltd.	14.2	14.2	52.4	123.6
	Sub Total D3	14.2	14.2	52.4	123.6
D4	**Omeprazol**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Cadilla Laboratories Ltd.	0	0	0	0
b)	Karosina Labs Ltd.	0	0	0	0
c)	Natco Pharma Ltd. **(Dr. Karanth Pharma Chemical Labs Pvt. Ltd.)**	0	0	0	0
	Sub Total D4	0	0	0	0
D5	**Diclofenac Sodium (2,6 Dichlorophenol)**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Amoli Organics	34	36	35	35
b)	Earnest John Drugs & Chemicals Pvt Ltd				
c)	Kairav Chemicals	475.6	410.7	382	382
d)	Orbit Pharma Laboratories				
e)	SOL Pharmaceuticals Ltd.				
f)	Aarti Drugs Ltd.				
	Sub Total D5	509.6	446.7	417	417
D6	**Chlorophenesin (4 Chlorophenol)**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Chemwell Pvt. Ltd.				
b)	Heinz India Pvt. Ltd.				
c)	Unilab Chemicals & Pharmaceuticals	40.1	39.2	39.2	39.2
	Sub Total D6	40.1	39.2	39.2	39.2
D7	**Isosorbide Mononitrate**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Natco Pharma Ltd. **(Dr. Karanth Pharma Chemical Labs Pvt. Ltd.)**				
b)	Sun Pharmaceuticals Industries Ltd.				
c)	Alliance Laboratories Pvt. Ltd.	1.2	1.2	1.2	1.2
d)	Micals Pharma Pvt. Ltd.	4.2	3.6		5.1
	Sub Total D7	5.4	4.8	1.2	6.3
PHARMACEUTICALS TOTAL (D1 - D7)		951.2	859.6	869.3	1180.9

ANNEX V
LIST OF IDENTIFIED ENTERPRISES IN METAL CLEANING INDUSTRIES [11]

No.	Enterprise	ODS	Consumption in 2001 (MT)
1	Novex	CTC	0
2	PLA Components	CTC	0.25
3	Triveni Engg Industries	CTC	0
4	Larsen and Toubro	CTC	0.32
5	Dinakaran	CTC	4.5
6	Carton Makers	CTC	0
7	Punjab Kesri	CTC	0.19
8	The Hindu	CTC	0.09
9	RK Graphics	CTC	0.38
10	Jaya Printers	CTC	0.1
11	Sai Sri Ram Printers	CTC	0.12
12	Rama Vision	CTC	0.06
13	Guru Hargobind Thermal Power Plant	CTC	24
14	WBPDCL, Kolaghat Power Station	CTC	0.05
15	HMT International	CTC	0
16	Orrjay Process	CTC	0.19
17	Sree Balaji Offset Printers	CTC	0.06
18	Jothi Color Scan	CTC	0.02
19	Universal Print System	CTC	0.06
20	South India Gravures	CTC	0
21	SAIL Durgapur	CTC	4.35
22	IISCO Burnpur	CTC	0.55
23	Hindustan Syringes	CTC	0.12
24	Premier Mills	CTC	3.98
25	Vardhaman	CTC	18
26	Ruby Mills	CTC	0.95
27	Multimetal Ltd	CTC	0.38
28	Hindustan Refrigeration	CTC	0.5
29	Atlas Wires Limited	CTC	4.8
30	Precision Wires India Limited	CTC	4.2
31	Bharat Insulation Company	CTC	0.3
32	Century Enka Limited	CTC	0.8

[11] There are 95 additional CTC consuming enterprises identified in Annex 2 of the Solvent Sector Strategy (Attachment 1). However, consumption data for these additional enterprises is not available.

No.	Enterprise	ODS	Consumption in 2001 (MT)
33	Indian Petrochemicals Corporation Limited	CTC	4.9
34	Crystal India Limited	CTC	12.03
35	Tata Steel	CTC	56
36	Bhushan Steels	CTC	28
37	Steel Authority of India Limited	CTC	186.39
38	Jindal Steel	CTC	20
39	Ispat Industries	CTC	10
40	Steelco Gujrat	CTC	5
41	E.B.G. Industries Ltd	CTC	5
42	Ruchi Strips	CTC	7.2
43	Tube Investment	CTC	4
44	Hero Strips	CTC	4
45	Pennar Steel	CTC	2.4
46	Asil Steel	CTC	2
47	Avery Strips	CTC	2.4
48	Surya Roshini Ltd	CTC	2.8
49	Uttam Steel	CTC	7.2
50	Lloyd Steel	CTC	4.8
51	North India Wire Limited	CTC	5.16
52	Military Engineering Services Limited	CTC	4
53	Best Heattreatment Services	CTC	4.8
54	Hindustan Aeronautics Limited	CTC	2
55	Omega Refrigerant	CTC	5
56	Ahmedabad Electricity Board	CTC	0.1
57	Blue Star Limited	CTC	6
58	Navdeep Engineering	CTC	49
59	Space Application Center	CTC	0.5
60	BHEL Hyderabad	CTC	0.24
61	Sapna Coils	CTC	20.69
62	Sapna Engineering	CTC	13.15
63	Engineers Industries	CTC	18.33
64	Hind Metal and tubes	CTC	48
65	Nissan Copper Private Limited	CTC	90
66	Western Engineering Company	CTC	35
67	Medium Sized Cold Rolling Mills	CTC	50
68	Small Metal Washing Companies	CTC	100

No.	Enterprise	ODS	Consumption in 2001 (MT)
69	Small Motor Manufacturers	CTC	200
70	Cable Manufacturers/Zinc Refineries	CTC	100
	Total		1185.41

ANNEX VI
LIST OF IDENTIFIED ENTERPRISES IN TEXTILE AND GARMENT INDUSTRIES

No.	Enterprise
1	Batra World Wide
2	Dhruv Globals Ltd
3	Mectech Knitfab Pvt Ltd
4	Bhola Hoisery Factory
5	Dewans Knit
6	Jain Udhay Fabric Ltd
7	Bhandari Export Ind. Ltd
8	Nagesh Knitwears Ltd
9	Duke Fabrics Pvt Ltd
10	Eakta Dyeing
11	Neetee Clothing (P) Ltd
12	Orient Craft Ind.
13	SPZ Overseas
14	TCNs Ltd
15	Modelama Export House
16	Parth Fashions Pvt Ltd
17	Tilak Export
18	Formost India Export
19	Toy N Toy International
20	Texport Fashions
21	Eagle Fashions
22	Henstich India
23	Anand Int. (India)
24	Dynamic India (P) Ltd
25	Mezzo Clothing (P) Ltd
26	Knit & Fit Export
27	Vam Overseas
28	Gopal Clothing (P) Ltd
29	Omega Export
30	Exotique Export
31	Gokal Das India
32	Gokal Das Intimatewear
33	Gokal Das Weil (P) Ltd
34	Puja Overseas

35	East West Connections
36	Dynamic Fashions (P) Ltd
37	S.G. Gemlex
38	Menakshi Textile
39	GTN Textile
40	Kores India Limited
41	Raghu Overseas
42	Gratech Fasion
43	Pan Paras Garments
44	Chamundi Textiles
45	Mysore Udhyog
46	Meenakshi Textiles
47	Makara Chemicals Tech.
48	GTN Textiles
49	Sri Nachhammai Cotton Textiles
50	SCM Textile processing
51	Cheran Processing
52	Rana Textile Processing
53	Rajalaxmi textiles
54	Bhawani Textile Processing
55	Exin Knits Private Limited
56	Signal Hosieries
57	Kamaleshi Dyeing
58	Amman Dyeing
59	Maruthi Processing
60	Rajagopal Textiles
61	Maharaja Shree Umaid Mills Limited
62	Aaradhna Industries (P) Ltd
63	Ambaji Dyeing & Printing Mills
64	Annapurna Industries P Ltd.
65	Samabandam Siva Mills
66	Balkishan Dyeing & Printing
67	Centwin Garments
68	Gupta Dyeing & Printing
69	Nemsons Silk Mills
70	Phalguni Silk Mills
71	Rameshwari Prints P Ltd

72	S.R. Silk Mills
73	Shreenathji Industries
74	Shri Rani Satti Processors P Ltd
75	Welknown Silk Mills P. Ltd
76	Amar Projects P. Ltd
77	Anjani Dyeing & Printing Mills
78	Raghunath Silk Mills
79	Shree Kay Tex Processors P Ltd
80	Vinayak Fabrics Ltd

ANNEX VII
LIST OF IDENTIFIED PHARMACEUTICAL ENTERPRISES CONSUMING CTC AS SOLVENT

E1	**Dexamethasone Phosaphate, Betamethasone Phosphate etc. (Pyrophosphoryl Chloride)**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Kemix Chemicals	9	9	9	9
b)	Nikava Pharmaceuticals	40.5	37.6	37.6	37.6
	Sub Total E1	49.5	46.6	46.6	46.6
E2	**Candesartan, Ceftazidime, Indeloxacine, Remoxirpide etc. (Trityl Chloride)**				
a)	Corvine Chemicals	28.4	14.8	1.05	5.85
b)	Soduim Metal	62.3	58.3	54	54
c)	Prashanthi Laboratories (Produce Losartum Potassium Chloestrol lowering drug)	20	20	20	20
d)	Yenkey Drugs and Pharmaceuticals Ltd	7	7	7	7
	Sub Total E2	117.7	100.1	82.05	86.85
E3	**Carbimazole (Bromoacetaldehyde)**				
a)	Innova Laboratories	7	6	6	6
	Sub Total E3	7	6	6	6
E4	**Para Nitro Benzyl Bromide (Intermediate for Bromohexine HCL).**				
a)	Leeds Kem	24.3	49.9	63.7	66.7
b)	Panchsheel organics	22	22	22	22
c)	Rajesh Chemicals	34.4	13	19.4	19.4
d)	Saurav Chemicals	0	60	60	60
e)	Flame Pharmaceuticals	13.6	3.3	0	0
	Sub Total E4	94.3	148.2	165.1	168.1
E5	**Benzophenone**				
a)	Dharamasi Morarji Chemicals Ltd.	41	40	38	38
	Sub Total E5	41	40	38	38
E6	**Bromobenzine**				
a)	BEC Chemicals Pvt Ltd	0	0	0	8
	Sub Total E6	0	0	0	8
E7	**Ethyl 4- Chloro Aceto Acetate**				
a)	Avon Organics Ltd	10	10	10	10
	Sub Total E7	10	10	10	10
E8	**Chloropyriphos**				
a)	Nagarjuna Agrichemicals	0	0	0	0
	Sub Total E8	0	0	0	0

E9	**Unknown applications**	2000-2001 (MT)	1999-2000 (MT)	1998-1999 (MT)	1997-1998 (MT)
a)	Nitya Pharmaceuticals	6	6	6	6
b)	BALAJI PHARMA	24	24	24	24
c)	DIVIS LAB	18	18	18	18
d)	LAXMI AGROCHEMICALS	20	20	20	20
e)	FISHER INORGANICS & AROMATICS	10	10	10	10
f)	MEDO PHARMA	4	4	4	4
g)	RAJ CHEMICALS	4.5	4.5	4.5	4.5
h)	TRIDENT HEALTHCARE	7	7	7	7
I)	HETERO DRUGS	na	na	na	na
j)	INDIAN DRUGS AND PHARMA	na	na	na	na
k)	HYDERABAD CHEMICALs	6	6	6	6
l)	OMTECH CHEMICALS	na	na	na	na
m)	SYMED LABS , HYDERABAD	2	2	2	2
n)	Pearl Organics	2.1	2.1	2.1	2.1
o)	Eupharma Laboratories Ltd.	0.9	0.9	0.9	0.9
p)	Micronova Pharmaceuticals,Bangalore	na	na	na	na
	Sub Total E9	104.5	104.5	104.5	104.5

ATTACHMENTS

Attachment I

TABLE OF CONTENTS

1. INTRODUCTION

1. India is a producer and consumer of ODS based solvents. India produces CFC-11, CFC-113 and CTC and imports methyl chloroform. The chemicals that are consumed in the solvent sector include:

- CFC-11
- CFC-113
- Carbontetrachloride (CTC), and
- Methylchloroform.

Of the above indicated chemicals, CTC consumption forms a major component in solvents sector.

2. The dates for phaseout date of consumption of each of these substances is given in the table below.

Particulars	CFC-11	CFC-113	CTC	Methylchloroform
Baseline	Average of 1995 to 1997	Average of 1995 to 1997	Average of 1998 to 2000	Average of 1998 to 2000
Reduction to be achieved	At baseline by 1July 1999 50 % of baseline by 1 January 2005 15% of baseline by 1 January 2007 100% of baseline by 1 January 2010	At baseline by 1 July 1999 50 % of baseline by 1 January 2005 15% of baseline by 1 January 2007 100% of baseline by 1 January 2010	None 85% of baseline by 1 January 2005. 100% of baseline by 1 January 2010.	Freeze at baseline by January 2003. 30% of baseline by 1 January 2005. 70% of baseline by 1 January 2010. 100% of baseline by 1 January 2015.

3. For achieving phaseout of these substances in a cost effective manner, a phaseout strategy needs to be prepared to reduce ODS consumption for each of these substances as per the proposed phaseout dates.

4. When the India Country Programme was prepared, the estimated consumption in solvent sector in 1991 was 4795 ODP tonnes. The consumption included CFCs, CTC and MCF. The sectors consuming solvents included

electronics, textile cleaning, pharmaceuticals, pesticides, rubber industry, chemicals and laboratory, sterilisation, metal cleaning industry etc. It was expected that due to liberalisation and high export growth rate, the consumption in solvent sector will reach 116573 ODP tonnes under unconstrained scenario by 2010. But due to implementation of Montreal Protocol, implementation of funded ODS phaseout projects in the sector, increased awareness on non-OD alternatives to solvents, the regulatory and business implications of phase-out and knowledge on other harmful effects of CTC (on stratospheric ozone), the consumption has dropped over the past ten years.

5. While CFC-11 and Methylchloroform are consumed by end use applications categorised as consumptive use under the Montreal Protocol, CTC and CFC-113 are used for applications, which are both feedstock applications and consumptive use. The details of the consumption of each substance have been discussed separately in the relevant sections. This strategy document addresses consumptive use of these substances as solvents. Phaseout of other uses such as feedstock use and use as process agents are separately covered under the respective sector strategy documents. These documents have been separately prepared by The World Bank.

6. The Government of India has also notified ODS Rules, 2000 under which the solvent consumption needs to be phased out in India. The ODS rules prescribe phaseout dates for individual categories of the substances and their applications. These rules cover all these four substances, which are used as solvents in India. Therefore, it is imperative that the phaseout strategy addresses compliance with the above dates as given under these rules.

7. Solvents, especially CTC based solvents, include consumption in both the formal and informal sector including Small and Medium Scale Enterprises (SMEs). Consumption in the informal sector constitutes a large proportion of the total consumption and needs to be addressed to ensure cost effective phaseout. Appropriate awareness generation and training interventions supported by technology transfer mechanisms needs to be suitably evolved in the strategy to support phaseout activities in this sector.

8. Keeping the above factors in consideration, the solvent sector strategy is prepared. Data for strategy preparation include inputs from survey conducted by Indian Chemicals Manufacturers Association (ICMA), solvent manufacturers, survey conducted by Indian Market Research Bureau (IMRB) and estimates based on inputs provided by industry experts. For identification of consumption, the supply channel (i.e., producers, dealers and distributors) were used. Consumer industries were identified based on information provided by supply channel.

9. Discussions were held periodically with Ozone Cell, industry experts, experts from UNIDO and The World Bank while preparing activities specified in the document. Solvent sector data collected by UNDP during the Country Programme Update was also incorporated in the report.

10. For implementation of different activities recommended in the strategy document, an institutional structure also needs to be developed with relevant linkages with the existing institutions in the country. This is critical to ensure effective coordination of activities and monitoring mechanisms for implementation.

11. The strategy document presents the consumption scenario for each of the substances, policy and institutional framework, awareness related activities including training and budgetary support for achieving ODS phaseout in solvent sector.

2. TRI CHLORO FLUORO METHANE (CFC-11)

This chapter presents the demand supply situation of CFC-11 in India.

2.1 PRODUCT DESCRIPTION

12. Trichlorofluoro Methane ($CFCl_3$) or CFC-11 is included in Annexure A Group I of the Montreal Protocol. It has an ODP of 1.

13. CFC-11 is a colourless liquid with slight odour. It is non-combustible but volatile, having a boiling point of 23.7^{o} C.

2.2 MONTREAL PROTOCOL PHASE OUT LIMITS

14. CFC-11 phase out schedule for production and consumption in India as set out in ODS Rules 2000:

Table 1 – Phase out schedule – CFC-11

Name of Group of ODS	Maximum allowable production in a period of twelve months as a percentage of calculated base level for group as a whole	Maximum allowable consumption in a period of twelve months as a percentage of calculated consumption of base level for group as a whole	Applicable from the year
Group I – includes CFC–11	50%	50%	2005
	15%	15%	2007
	0%	0%	2010

Source: ODS Rules 2000

2.3 SUPPLY SCENARIO

15. There are four manufacturers of CFC-11 in India namely SRF Limited, Navin Fluorine Industries, Gujarat Fluorochemicals Limited and Chemplast Sanmar Limited. Table below shows the production of CFC-11 between 1995 and 2001.

Table 2 - Production of CFC-11 between 1995 and 2001

(All figures in MT)

Particulars	1995	1996	1997	1999	2000	2001
Total	6,608	7,282	8,635	6,057	5,633	4,513

Source: Article 7 data report and Technical audit report for CFC production phaseout

16. Production of CFC-11 is being controlled through a quota system that leads ultimately to a complete ban on production of CFC. Production quantities will gradually be reduced to zero for CFCs by 2010. Implementation of this policy falls within the scope of the CFC Production Sector Plan. Further, the import of CFC-11 is under an import license, and in the past few years, there has been no import of the above substance. Therefore, it is considered that these regulations will also act as control measures for consumption phase out.

2.4 CONSUMPTION SCENARIO

17. Of the total production, domestic consumption and export of CFC-11 are given in the table below:

Table 3 - Domestic consumption and Export of CFC-11 between 1995 and 2001

(All figures in MT)

Particulars	**1995**	**1996**	**1997**	**1999**	**2000**	**2001**
Total production	**6,608**	**7,282**	**8,635**	**6,057**	**5,633**	**4,513**
Domestic Consumption	2,534	2,756	2,984	2,093	1,829	NA
Exports	4,074	4,526	5,651	3,964	3,804	NA

Source : Article 7 data report and Technical audit report for CFC production phaseout

18. Survey report indicates that most of CFC-11 produced within the country is used for foam blowing applications, aerosol applications and refrigeration and air-conditioning applications. No consumption has been currently reported in solvent applications, though CFC-11 consumption as solvent was reported in the past.

2.5 END USE APPLICATION OF CFC-11 IN SOLVENT SECTOR

19. As mentioned earlier, CFC-11 is used in foam blowing applications and as a solvent in aerosol sector. Separate approvals have been obtained for phasingout ODS in foam blowing applications (as a part of commercial refrigeration applications) and aerosol sector in the 38th meetings of the Executive committee to address the remaining consumption of CFC-11. The total amount of ODS phased out through these sector strategies aggregate to about 535 MT and 103 MT, respectively.

20. As these sectors are separately addressed through sectoral phaseout strategies i.e., foam sector and aerosol sector, and as no consumption of CFC-11 in solvent sector has been identified, this report does not include phaseout projects for CFC-11 relating to the solvent sector.

3. 1,1,2-TRICHLORO 1,2,2-TRIFLOROETHANE (CFC-113)

The chapter sets out the supply and demand for CFC-113 as solvent use in India.

3.1 PRODUCT DESCRIPTION

21. 1,1,2-Trichloro 1,2,2-Trifloroethane or CFC-113 is included in Annexure A Group I of the Montreal Protocol. It has an ODP of 0.8.

22. CFC-113 is a colourless liquid with slight odour. CFC-113, a fluorinated hydrocarbon, is non-toxic, non-flammable and non-corrosive with low surface tension. It is an excellent solvent with good penetrating action and is selective against oils and fats, leaving base materials like plastic, metal, fabric, etc. unaffected.

3.2 MONTREAL PROTOCOL PHASE OUT LIMITS

23. CFC-113 phase out schedule for production and consumption in India as set out in ODS Rules 2000:

Table 4 – Phase out schedule – CFC-113

Name of Group of ODS	Maximum allowable production in a period of twelve months as a percentage of calculated base level for group as a whole	Maximum allowable consumption in a period of twelve months as a percentage of calculated consumption of base level for group as a whole	Applicable from the year
Group I – includes CFC–113	50%	50%	2005
	15%	15%	2007
	0%	0%	2010

Source: ODS Rules 2000

3.3 SUPPLY SCENARIO

24. The commercial production of CFC-113 in the country started in 1990 with the setting up of a manufacturing facility by Navin Fluorine Industries (NFI). NFI is the sole manufacturer of CFC-113 and has an installed capacity of 150 MT. Table below gives the past supply of CFC-113:

Table 5 - Domestic production and Import of CFC-113 between 1995 and 2001

(All figures in MT)

Particulars	1995	1996	1997	1999	2000	2001
Production	47	-	-	38	5.5	14.8
Import	-	-	12	-	16.0*	-

Source: Article 7 data report and Technical audit report done by MOEF for CFC production phaseout.
**Imports by Bharat Electronics Limited.*

The brand name of CFC - 113 manufactured by NFI is Mafron-113. NFI used to manufacture different azeotropic mixtures of CFC-113 mixed with Methanol, Isopropanol, Acetone, Methylene Chloride. The common azeotropic blends manufactured by NFI are:

Table 6 – Brands produced by NFI

	Brand Name	% of Chemicals
a.	Mafron MMS 113	CFC-113 : 93.5% Methanol : 6.5%
b.	Mafron MI 113	CFC-113 : 65% Isopropanol : 35%
c.	Mafron MA 113	CFC-113 : 89% Acetone : 11%
d.	Mafron MMC 113	CFC-113 : 50.6% Methylene : 49.4%

25. As per ODS Rules, 2000, NFI cannot expand the capacity of CFC-113. Since the demand for CFC-113 is very low, there is very limited production of CFC-113 in the past years.

26. As per the technical audit report for CFC production phaseout, most of CFC-113 is produced by NFI as a feedstock for production of CFC-113a, which is used for certain specialised applications including Research and Development (R & D) applications. The production of CFC-113 is only a few tonnes and caters primarily to R & D requirements in NFI.

27. In the past, CFC-113 was imported from countries like USA, Japan, Singapore, Belgium etc. Since 1995, import of CFC-113 is under license and no license to import CFC-113 has been issued in the year 2001 and 2002. Further, production of CFC-113 is also controlled through a quota system that leads ultimately to a complete ban on production of CFC by 2010. Implementation of this policy falls within the scope of the CFC Production Sector Plan. These regulations are expected to provide control measures for consumption phase out.

3.4 CONSUMPTION SCENARIO

28. Of the total production, domestic consumption and export of CFC-113 are given in the table below:

Table 7 - Domestic consumption and Export of CFC-113 between 1995 and 2001

(All figures in MT)

Particulars	1995	1996	1997	1999	2000	2001
Domestic sales			12	-	-	4.7
Feedstock use as per NFI data			-	38	5.5	
Exports			-	-	-	4.5

Source: Article 7 data report and Technical audit report for CFC production phaseout.

29. Bharat Electronics Limited (BEL) has reported CFC-113 consumption aggregating to about 16 ODP Tons in the year 2000. This company has imported CFC-113 for consumption, though a license for the same was not obtained prior to imports. Apart from this, as per survey report, there is no reported CFC-113 consumption in the country.

3.5 END USE APPLICATION OF CFC-113 IN SOLVENT SECTOR

30. Traditionally**,** CFC-113 found application in a number of industries. Some of the major uses were in:

- Printed Circuit Boards Cleaning,
- Precision Cleaning and Metal Cleaning,
- Blade Manufacture, and
- Syringe Manufacture.

Currently, none of these enduser segments reported use of CFC-113 and have switched over to alternative technologies. Five enterprises in these industries have converted after receiving funding assistance from Multilateral Fund Secretariat.

31. As mentioned earlier, negligible quantity of CFC-113 is produced and is mainly used by NFI for Research and Development or as feedstock. Further, no import license for CFC-113 is reported for 2000 and 2001. Hence, except for project submitted by BEL, this report does not include phaseout projects relating to the solvent sector.

3.6 PROJECTED DEMAND FOR CFC-113

32. As demand for CFC-113 at present is negligible, it is not envisaged that demand for CFC-113 as a solvent will increase in the coming future. Further, awareness, training and the interventions sought through various measures

initiated by the Government of India is likely to result in limited or no additional demand for CFC-113 in the sector.

3.7 APPROACH TO PHASEOUT CFC-113

CFC-113 is proposed to be phased out through investment projects.

4. CARBON TETRA CHLORIDE

The chapter sets out the supply and demand outlook for CTC as solvent use in India.

4.1 PRODUCT DESCRIPTION

33. Carbon tetra chloride (CTC) was included as a controlled substance under Annexure B Group II of the Montreal Protocol through London Amendment in 1990.

CTC has an ODP of 1.1 and is a heavy, colourless liquid at normal temperature and pressure and has a distinctive odour. Its boiling point is 76.5^{o} C and it is non-flammable. It is a powerful solvent and is miscible with most organic liquids including ether, chloroform, benzene etc. It is insoluble in water.

34. Primary, consumption of CTC in India is for feedstock use by CFC producers and producers of cypermetherin as well as solvent and process agent.

4.2 MONTREAL PROTOCOL PHASE OUT LIMITS

35. CTC phase out schedule for production and consumption for India as set out in ODS Rules 2000:

Table 8 – Phase out schedule – CTC

Name of Group of ODS	Maximum allowable production in a period of twelve months as a percentage of calculated base level for group as a whole	Maximum allowable consumption in a period of twelve months as a percentage of calculated consumption of base level for group as a whole	Applicable from the year
Group II (B) – includes CTC	25%	15%	2005
	0%	0%	2010

Source: Montreal Protocol Handbook, ODS Rules 2000

4.3 SUPPLY SCENARIO

36. There are currently three manufacturers of CTC in India.

- Gujarat Alkalies and Chemicals Limited,
- Chemplast Sanmar Limited, and
- SRF Limited.

37. Shriram Rayons Limited also produced CTC but has stopped production since 1999 and NRC Limited has stopped production since 1994.

38. The annual installed capacities of Gujarat Alkalies and Chemicals Limited (GACL), Chemplast Limited and SRF Limited are 21,120 MT, 22,000 MT and 22,550 MT respectively. While GACL uses the chlorination of methane route, Chemplast and SRF use the chlorination of methanol route for manufacturing CTC.

39. SRF, GACL and Chemplast produce CTC, methylene chloride and chloroform in the same facility. Typically these are produced in the following ratio.

PRODUCT	PERCENTAGE
CTC	30
Methylene Chloride	40
Chloroform	30

40. Further, as per the enterprises, this ratio can be varied to minimise CTC output to as low as 20 % of the total production.

41. The production of CTC as per the Article 7 reporting and based on survey findings are presented below. As mentioned previously CTC is also consumed as a process agent and is addressed through a separate sectoral phaseout strategy for process agents. This survey is being separately conducted by The World Bank through Indian Chemicals Manufacturers Association (ICMA) and the production estimates of CTC based on their survey findings are also presented below:

Table 9 - Domestic production of CTC between 1998 and 2001

(All figures in MT)

Particulars	1998	1999	2000	2001
Based on survey on manufacturers of CTC	19,162	19,622	17,547	16,458
Based on ICMA survey	19,225	20,138	17,509	16,459
Based on Article 7 reporting	19,225	20,138	17,509	NA

42. The remaining demand is met through imports by CFC producers, cypermethrin producers for feedstock consumption and some large process agents. No CTC has been imported for use as solvent as indicated by the survey conducted by IMRB and ICMA. . Imported CTC is governed by a license system and is allowed for consumptive and feedstock use only and to registered users. The total quantity of CTC imported in the last five years is given in the table below:

Table 10 – Import of CTC between 1998 and 2001

(All figures in MT)

Particulars	**1998**	**1999**	**2000**	**2001**
Based on ICMA Survey	14,641	24,460	19,904	24,661

43. Total availability of CTC (i.e., supply of CTC) including domestic production and import is given in the table below:

Table 11 – Total CTC supply between 1998 and 2001

(All figures in MT)

Particulars	**1998**	**1999**	**2000**	**2001**
Range of total CTC Supply				
Minimum	33,803	44,082	37,413	41,119
Maximum	33,866	44,598	37,451	41,120

44. At present, there is no mechanism to control production of CTC, though as mentioned previously CTC import is governed by a license. It is expected that CTC production will be phased out using a similar system to CFC production phase out. But given the timeframe to comply with the first phase out by 85% of baseline production by 2005, India may look at additional measures to control supply into the market, which are discussed later in this report. Moreover, these measures may be essential to ensure compliance on the consumption front for CTC, wherein also a reduction of 85% from the baseline is to be achieved by 2005.

4.4 CONSUMPTION SCENARIO

45. CTC is used for application as a solvent and for other uses such as:

- Feedstock usage for production of CFCs,
- Process agent applications (e.g., chlorinated rubber, pharmaceutical industry, pesticide industry),
- Other feedstock uses such as cypermetherin manufacture,
- Laboratory reagent usage etc.

46. As mentioned previously, the survey for assessment of the above uses has also been separately conducted by The World Bank and the data of usage for the above applications is given in the table below:

Table 12 – Sub sector wise CTC end use consumption for the year 2001

CTC Supply and Demand	MT	Total (MT)
Supply		41,120
CTC Production	16,459	
CTC Import	24,661	
Demand		38,763
Feedstock Applications		
CFC Production	24,298	
DV Acid Chloride	8,311	
Laboratory Reagents	40	
Sub-Total	32,649	
Process Agents		
Sub-Total	1,742	
Solvent		
Textile Applications	1,500	
Other cleaning applications	2,114	
Sub-Total	3,614	
Miscellaneous Applications*		
Sub-Total	758	

Note: The discrepancy between the total supply and demand is likely to be due to mismatch between fiscal year and calendar year data and CTC held as inventory at ports.

** Miscellaneous applications include applications of CTC primarily in other pharmaceutical applications such as Para Nitro Benzil Bromide, Ceftazidime, Ethyl Chloroacetoacetate etc. These do not fall under Table A of Decision X/14 (process agent applications).*

47. Based on estimates provided by the industry, the total consumption of CTC as solvent and process agent for the year 2001 is given below.

Table 13 – CTC sold to solvent users

(All figures in MT)

Company	**2001**
SRF Limited	763
Gujarat Alkalies and Chemicals Limited	1,308
Chemplast Sanmar Limited	1,543
Total	3,614*

Source: Information provided by producers and best estimates.
**Small percentage is for the pharmaceutical sector.*
** The data relates to CTC sold for solvents and process agents for the year 2001.*
** No imports of CTC for solvents and process agents is reported for the year 2001.*

ICMA survey also indicates small quantities of consumption of CTC in lab reagent applications and the consumption estimates for the year 2001 is almost nil.

48. Feedstock and laboratory reagent consumption is exempt under Montreal Protocol and the process agent sector is being separately addressed through the process agent strategy, therefore the focus of the report is on CTC consumed as solvents.

4.5 END USE APPLICATION OF CTC IN SOLVENT SECTOR

49. As per the survey assessment, consumption is primarily in the sub sectors listed below:

- Textile,
- Metal cleaning applications

50. The consumption of CTC as a solvent in textile cleaning and metal cleaning applications is given in the table below.

Table 14 – CTC consumption by user segments

(All figures in MT)

Segments	**2001**
Textile cleaning	1,500
Metal cleaning	2,114
Total	3,614

Source: Information provided by producers, UNDP survey and best estimates.

51. As mentioned earlier, metal cleaning industry has different applications. Given the size of unorganised sector, the size of individual applications in different user segments have been identified based on inputs from the supplier

industry, survey data wherever possible and residual consumption estimates. This has been presented in the table below.

Table 15 – CTC consumption by user segments

(All figures in MT)

Particulars	**Consumption**
Solvent in textile consumption	1500
Thermal power plants	300
Cold rolling applications	210
Motor parts cleaning	200
RAC pipe cooling	500
Metal cleaning and other applications	904
Total	**3614**

Source: Survey data from IMRB, UNDP and best estimates.

52. Exhaustive identification of individual companies consuming solvents is not feasible given the size of unorganised sector. However, based on supply of CTC, the consumption levels have been identified and this is expected to constitute more than 90% of the consumption in this sector.

53. Consumers in textile industry primarily purchase CTC in small quantities and use it for cleaning fabric. Very few companies are large in size i.e., consume more than 10 MT per annum. Most of them buy CTC in very small quantities on a need basis and use it for textile cleaning applications.

54. In metal cleaning applications, consumers include both large and small size companies. The consumer segments include in power plants, cleaning of newsprint machinery, industries for cleaning metallic parts, refrigeration and air conditioning equipment cleaning, heavy machinery cleaning, motor parts cleaning, cleaning of electronic equipment, precision cleaning etc.

55. The large consumers of CTC are primarily in large metal cleaning industries, manufacturing tubes, coils and other metallic components producers, large process cleaning applications etc. There are a large number of small companies consuming small quantities of CTC in metal cleaning in different applications.

56. CTC is also consumed as a lab reagent. Identified consumption during the survey aggregates to about 40 MT. However, the expected consumption in lab reagent applications may be higher than this.

57. A list of the identified companies, at this stage, is given in Annexure 1 to this report. Annexure 2 presents a list of companies which are identified where consumption is not known Many of the companies are in the unorganised sector and hence, do not have a significant consumption. Annexure 3 presents list of identified industries consuming CTC in textile sector.

4.6 STRATEGY FOR PHASINGOUT CTC IN SOLVENT SECTOR

Strategy to phaseout CTC includes measures for phasingout CTC production and consumption. CTC production sector phaseout project is separately being prepared for consideration by the Executive Committee. CTC consumption phaseout activities will include a mix of investment and non-investment activities. Investment projects for solvents and process agent sub-sector have been formulated and included in separate project proposals. Remaining consumption of CTC is proposed to be addressed through capacity building and related non-investment activities like awareness programs, information exchange program, training programs, incentive schemes, demonstration programs, innovative financing mechanisms etc. Detailed strategy and action plan for such non-investment activities are presented in Section 6, 7 and 8.

5. 1,1,1-TRICHLORO ETHANE

5.1 PRODUCT DESCRIPTION

58. 1,1,1-Trichloro Ethane (TCA) or Methyl Chloroform (MCF) is a controlled substance, which falls in Annex B Group III of the Montreal Protocol. It has an ozone depletion potential of 0.1.

59. TCA is a colourless liquid with specific gravity of 1.32 and a boiling point of 74 ^{o}C. It is inflammable as well as insoluble in water but soluble in alcohol and ether and is used for cleaning of electronic components and precision instruments.

5.2 MONTREAL PROTOCOL PHASE OUT LIMITS

60. TCA phase out schedule for production and consumption:

Table 16 – Phase out schedule – TCA

Name of Group of ODS	Maximum allowable production in a period of twelve months as a percentage of calculated base level for group as a whole	Maximum allowable consumption in a period of twelve months as a percentage of calculated consumption of base level for group as a whole	Applicable from the year
Group III (B) – includes TCA	80%	70%	2005
	40%	30%	2010
	0%	0%	2015

Source: Montreal Protocol Handbook, ODS Rules 2000

5.3 SUPPLY SCENARIO

61. The sole manufacturer of TCA in the country was Standard Alkalies Ltd. which has discontinued production since September 1993. At present there are no manufacturers of TCA in the country. The entire requirement of TCA is met only through imports, mainly from Japan, USA, Belgium and UK, France, Germany, Netherlands, UK and Belgium.

62. There are number of importers of TCA in the country. Some of them were earlier dealers of Standard Alkali and have now started importing the product. They are mainly catering to small users whose annual requirement typically lies between 100 and 150 Kgs.

63. DGCIS is the apex authority associated with compilation of import statistics into India. The import figures of TCA, as reported by Ministry of Environment and Forests and DGCIS, for 1998-2001 are shown below:

Table 17 - Import of TCA between 1998 and 2001

(All figures in MT)

Particulars	1998	1999	2000	2001
Imports	3,241	3,264	3,176	NA
Exports	1,179	-	-	-

Note: Based on Article 7 data reports

Thus the baseline consumption of TCA, estimated as average consumption between 1998 and 2000, amounts to 2,834 MT (283.4 ODP tons).

64. As ODS Regulations, 2000 prohibit setting up of production of methyl chloroform (as it is an ODS), no additional interventions are sought to regulate production of TCA in India. Further the demand of TCA is met through imports, which are governed by a license system. Therefore, control measures for TCA could be in the form of import quotas along identification of imports through a separate customs code, the mechanism for which is discussed later in the report. Refer para 91.

5.4 CONSUMPTION SCENARIO

65. In the past, TCA was used as a cleaning agent and traditionally the few large application areas were:

- Printed Circuit Boards,
- Precision Cleaning, and
- Metal Cleaning and other miscellaneous uses.

The current survey has not identified consumption of TCA by user enterprises in India as the user industries are likely to be dispersed and may not be directly identified through structured survey.

66. India has two projects approved for conversion from TCA to alternatives in solvent sector. The total funds approved and impact in ODP tons for these two projects aggregate to US $ 340,000 and 14 ODP tons, respectively. The average cost effectiveness for these project worksout to US $ 25.6 per ODP kg.

67. As there are no large companies identified, which have consumption of TCA, individual projects have not been identified and included in this document.

68. The consumption in this sector, therefore, needs to be addressed through a multi-pronged approach which include regulations for controlling and monitoring supply of TCA, project assistance for eligible enterprises and information dissemination and technology transfer to small users. This would include:

- specific programs for identification of remaining user industries through mass media advertisement with specific deadlines,
- project preparation assistance with support for implementing agencies for eligible enterprises,
- information dissemination on alternative technologies at industrial pockets consuming large quantities of TCA. Use of SATS and industry associations, as described later, can be useful in phasing out consumption in this sector.

Ozone Cell, through its arm for implementing solvent sector phaseout, should take up timely implementation of activities. Immediate commencement of activities in this regard will help in timely and cost effective phaseout of TCA in user industry.

5.5 STRATEGY FOR PHASINGOUT TCA

Part of phaseout of TCA is already achieved through investment projects approved in the past. The remaining consumption is proposed to be addressed through activities similar to those dealt with in Section 4.6.

6. POLICY AND INSTITUTIONAL FRAMEWORK

6.1 INSTITUTION AND IMPLEMENTATION FRAMEWORK

69. **Ministry of Environment and Forests** (MoEF): The Government of India has entrusted the work relating to Ozone layer protection and implementation of Montreal Protocol to the Ministry of Environment and Forests (MoEF). MoEF has set up a National unit, the Ozone Cell, to look after and to render necessary services to implement the Protocol and Ozone Depleting Substances (ODS) phase out in India. ***MoEF will be the implementing agency and will be responsible for project implementation, monitoring and supervision through the Ozone Cell and its dedicated unit for Solvent Sector***. In addition, the following key units assist the Ministry in ODS phaseout activities in India.

- **Empowered Steering Committee**: An Empowered Steering Committee has been constituted under the chairmanship of Secretary (Environment and Forests), for overall supervision and to take all policy decisions for implementation of the Protocol and Country Programme in India.

- **Technology and Finance Standing Committee** (TFSC): TFSC has been established to provide policy guidance, direction and oversight to the Montreal Protocol program. The TFSC reviews and approves all project activities to be undertaken with funding from the MLF; it consists of representatives from relevant line Departments/Ministries, national research institutions and industry associations.

- A **Society** has been registered with members from Ministry of Environment and Forests, Ozone Cell, Ministry of Chemicals, Ministry of Industries, other associated line ministries and the industry to facilitate set up of Project Management Units (PMUs) to implement and monitor individual sectoral projects under Montreal Protocol. The main responsibilities of the PMUs are given below:

  - Implementing and reviewing ODS phase-out plan;
  - Assisting Government of India in implementing ODS phase-out policies including ODS production quota system;
  - Conducting training/workshops/seminars/public awareness for various stakeholders in the phase-out programmes including PMU staff.

  The President of the Society is the Additional Secretary, Ministry of Environment and Forests and the Secretary of the Society is the Director, Ozone Cell. The management structure of the Society ensures that all the sub-units implementing specific project activities are reporting to the Ozone Cell.

- **Project Management Unit (PMU) for CFC production sector phaseout** : The Multilateral Fund had approved the CFC Production Sector Gradual Phase-out Project in the 29th meeting of the Executive Committee held at Beijing in November, 1999. A PMU is established under the MoEF for providing technical assistance for the project. This unit also forms a subpart of the society discussed previously.

70. **Line Ministries and Departments**: Several line ministries and authorities (Department of Fertilizer and Chemicals, DGFT, Customs) will be directly and indirectly involved in successful implementation of the project. Responsibilities of these agencies include the following:

- Participation in the formulation and review of the overall ODS phase-out program;
- Issuing exports licenses to each participating enterprise;
- Monitoring production as reflected in excise returns, etc.;
- Monitoring exports to verify compliance with Annual Programs; and
- Coordination with PMUs to address new problems encountered during project implementation.

71. In addition to the above, the Ozone Cell periodically interacts with the Central and State Pollution Control Board(s), industry associations, technical institutions and select industry representatives for taking decisions relating to Montreal Protocol Implementation in India.

6.2 SOLVENT SECTOR PHASE OUT MANAGEMENT FRAMEWORK

72. The solvent sector phase out plan will be implemented under the direct supervision of the Director, Ozone Cell, Ministry of Environment and Forests, Government of India. To strengthen functioning and coordination of the Ozone Cell in implementation of phase out of OD solvents in India and conversion to alternative non ODS based technology, a **Solvent Phase Out Unit** (SPO) would be set up under the aegis of the Ozone Cell. The SPO would also form part of the Society and be governed by the rules of the society.

6.2.1 Solvent phase out unit

73. The structure of the SPO may be similar to the Project Management Unit (PMU) set up for managing the CFC production phase out project. The SPO would be headed by a Subject Specialist. The SPO will have a technical team, which will be working on implementation of investment and non-investment projects relating to the solvent sector phaseout.

Roles

The broad role of SPO would entail development of detailed implementation plan and overall monitoring and supervision of the solvent sector phase out, as per the solvent sector phaseout agreement. Details of list of activities of SPO are given below.

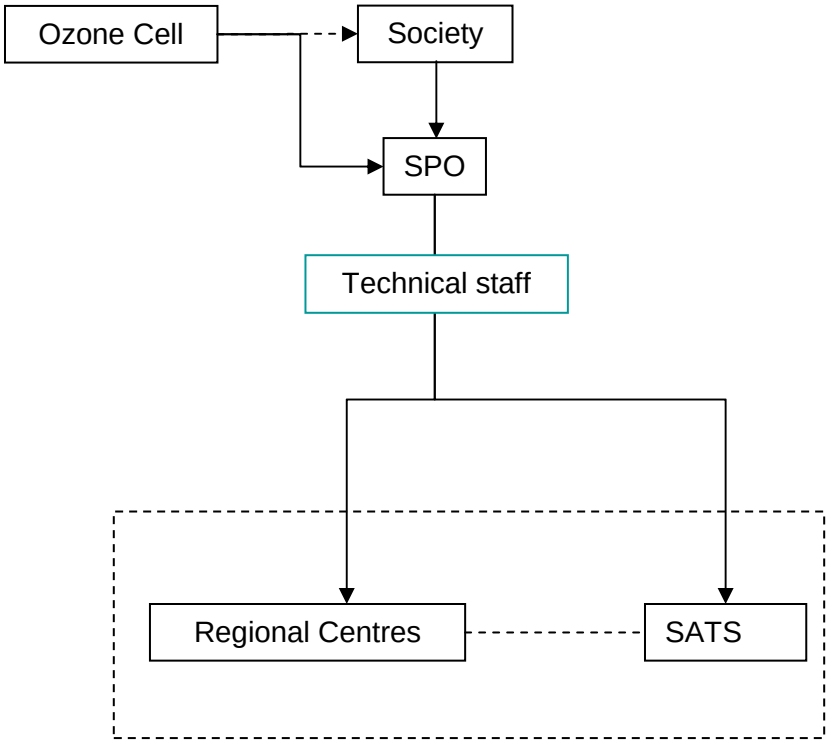
- Preparation and implementation of the Annual programme for ODS phaseout in solvents sector,
- Identification and assistance in design of sub-projects for OD solvent phase out,
- Monitoring and supervision of project implementation at national level including coordination of independent verification of ODS phaseout by the beneficiary enterprises,
- Information exchange support to Ozone Cell, regional centres and beneficiary enterprises,
- Periodic assessment of supply situation of non-OD solvents and providing inputs to the Ozone Cell on the same,
- Support implementation of information exchange and training activities. This will include coordination with Solvent Alternative Technology Services (SATS) units to ensure timely information dissemination and facilitation of phaseout activities in small and medium scale enterprises,
- Periodic assessment of supply and availability of non-OD alternatives and introducing interventions, if required, to assure the same,
- Maintenance of database and relevant records related to solvent sector, and
- Monitoring of impact of activities implemented.

Linkages

The interlinkages that will be established by the SPO with other key stakeholders are given below:

- Coordinate with industry and industry representatives on activities relating to monitoring and implementation of phase out of OD solvents.
- Coordinate with implementing agencies on OD solvent phase out matters especially preparation of Annual Plan and Review Mission activities as per agreement.
- Coordinate with Ozone Cell and report to Director, Ozone Cell on SPO related activities and identification of interventions.
- Coordinate and supervise the functioning of the Regional centres for implementation of solvent sector phaseout activities.

Figure 1 – Framework for SPO



74. To ensure single point coordination of activities, which will be mainly implemented between 2003-2005, geographic reach to different large consumption pockets in the country and to facilitate overall implementation of Montreal Protocol of which solvent sector is a sub component, option of using Regional Offices of the Ministry or local SISI offices may be considered by the Government for regional support for phaseout activities.

75. The regional centres, as mentioned above, would primarily be involved in supporting implementation and monitoring of activities planned at the State Level. In specific terms, they will:

- Assist in supporting ODS phaseout activities relating to solvent sector at State level,
- Act as centres for information exchange for enterprises and coordinate, on a need basis, with the Central SPO,
- Assist in coordinating training and awareness related activities,
- Monitor and report training related activities undertaken by SATS.

The State level decentralisation will ensure higher levels of commitment from the State Government and greater effectiveness in implementation of activities.

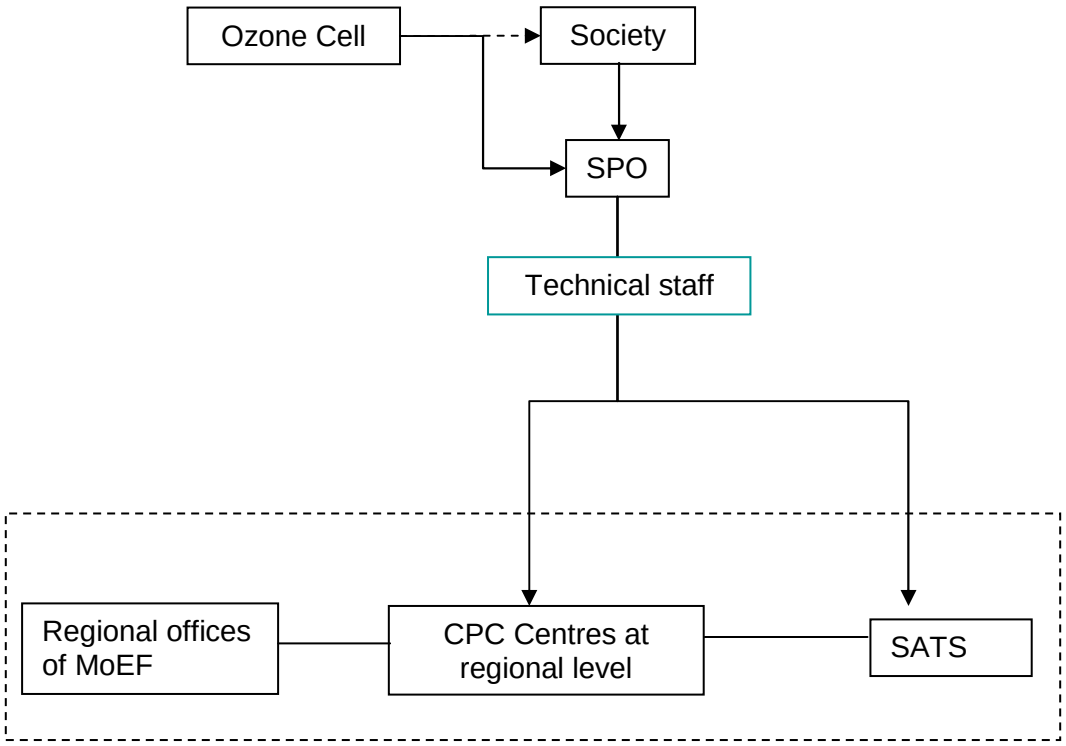
76. It is envisaged that the SPO be functional primarily till 2010, coinciding with the complete phase out of production and consumption of CFC and CTC. Further, for a period beyond 2010, monitoring will be carried out by the SPO for MCF phaseout activities. At this stage, this unit may become a sub unit under the MoEF or appropriately structured as desired by the Government of India.

6.2.2 Linkage to UNIDO/UNEP National Cleaner Production Centres

77. The regional offices of National Cleaner Production Centre (NCPC) located in different parts of India can be considered for technical support and assistance in information dissemination and technical inputs for conversion to alternative technologies. Given their local presence and experience in handling technology transfer issues, their resources can be gainfully used in ODS phaseout in solvent sector.

78. They can provide support in the form of "help desk" services at industrial parks/estates in the large consumption pockets such as Tamil Nadu, Gujarat, Maharashtra, Delhi etc. on alternative technologies and their adoption. Such services could be rolled out of industrial estate management offices, which will be the nodal information dissemination centres. Further, they can work closely with the SATS, which will be established in the regions for implementation of phaseout activities. In light of the above benefits, these centres can play a key role in OD solvent phaseout activities. A schematic diagram for implementation is presented below.

Figure 2 – Engaging Cleaner Production Centre



79. While majority of the implementation steps will be undertaken in 2003 to 2005, the focus in the remaining years will be on monitoring implementation, sustained information support and implementation of regulations to sustain compliance.

6.3 SOLVENT SECTOR RELATED REGULATIONS

80. India has in place several types of policy instruments to ensure a cost-effective and systematic phase-out of OD solvents. Policy instruments include command and control measures as well as market based instruments.

81. In accordance with the National Strategy for ODS phase out, Ministry of Environment and Forests (MoEF), Government of India, has notified rules covering various aspects of production, sale, consumption, export and import of ODS. These regulatory measures are a part of the Ozone Depleting Substances (Regulation and Control) Rules, 2000, which have been notified in the Gazette of India on July 19, 2000.

82. These rules need to be reviewed in the context of needs of solvent sector phaseout and appropriate measures need to be taken to regulate systematic phaseout of OD solvents in line with the country needs.

83. Some of the key factors that need to be considered in connection with the Solvent sector are given in the following sections.

6.3.1 Rules and regulations

84. **Production and consumption**: The various phase out dates of ODS used as solvents is set out below:

Table 18 – Phase out dates

Name of Group of ODS	Maximum allowable production in a period of twelve months as a percentage of calculated base level for group as a whole	Maximum allowable consumption in a period of twelve months as a percentage of calculated consumption of base level for group as a whole	Applicable from the year
Group I – includes CFC–11 and CFC–113	50%	50%	2005
	15%	15%	2007
	0%	0%	2010
Group IV – includes CTC	25%	15%	2005
	0%	0%	2010
Group V – includes MCF	80%	70%	2005
	40%	30%	2010
	0%	0%	2015

Source: ODS Rules, 2000

Production of CFC-11 and CFC-113 are being controlled through a quota system that leads ultimately to their complete production phaseout. Production quantities will gradually be reduced to zero for CFCs by 2010. Implementation of this policy falls within the scope of the CFC Production Sector Plan. As there are no imports of the above substances currently, these regulations are also expected to act as control measures for consumption phase out. It is expected that CTC production will be phased out using a similar system to bring production down to zero by 2010. Control measures relating to imports of Methylchloroform (MCF) are also being implemented as per the phaseout schedule under the Protocol and this is expected to reduce the supplies of MCF as per the Protocol limits.

85. **Consumption**: The ODS Rules further identify regulation on consumption of ODS on end use basis as detailed in Schedule – IV. In accordance with the Rules, production of different products consuming Group I, III, IV and V substances are to be phased out by 1 January 2010.

86. **User registration**: The Rules also provides for compulsory registration of ODS producers (includes CFC and CTC producers), manufacturers of ODS based products, importers, exporters, stockists and sellers. They are also

required to maintain records and file periodic reports for monitoring production and use of ODS.

87. **International trade**: Trade of ODS with non Parties is banned. The export of these ODS to Non Article 5 countries is also banned. The import and export of ODS are subject to licensing requirement. Further, import of CTC and MCF is sanctioned based on end use declaration only, for both feedstock or consumptive use in India.

88. **Capacity creation**: Creation of new capacity or expansion of capacity of manufacturing facilities of ODS and ODS based equipment is prohibited. Purchasers of ODS for manufacturing products containing ODS, are required to declare the purpose for which ODS is purchased.

89. **Promotion of non OD alternatives**: The Government of India has been providing fiscal incentives to promote conversion to non ODS based alternatives through exemption from payment of customs and excise duties on capital goods required to implement ODS phase out projects.

90. **Manufacture, Storage And Import Of Hazardous Chemical Rules, 1989**: CTC is also covered by this Rule, which primarily regulates, manufacture, storage, safety requirements and import of CTC.

6.3.2 Intervention on regulations

91. The regulatory interventions that are proposed for ODS phaseout in solvent sector are presented below. These interventions have been designed keeping in mind the country's need to comply with the Protocol requirement for ODSs used in the solvent sector, anticipated developments in the industry, both producers and consumers of CTC, level of small enterprises and informal industrial units consuming ODSs in the solvent sector etc. The regulations address CFCs, CTC and MCF consumed in the solvent sector.

92. For effective implementation, the existing regulations relating to solvents also need to be reviewed for realigning them, as necessary, to cater to the needs of the solvents sector.

93. As mentioned earlier, CFCs are currently being controlled under the CFC production quota system. Further, CFC import is also licensed. Given this situation, no additional interventions are proposed for phasing out production of CFCs for solvent use.

94. Methyl chloroform (MCF) is currently being imported into the country and there is no domestic production. As ODS Regulations, 2000 prohibit production of methyl chloroform (as it is an ODS), the control measures for MCF should be in the form of **import permits/quotas**. These quotas shall be given based on the proportion of baseline levels for each of the importers. Against these import quotas, a reporting mechanism will be designed for the quota holders to report

imports of these substances on a quarterly basis. This will be reviewed on an annual basis to decide on quotas for the future years.

95. CTC is mainly used as a feedstock, process agent and solvent. CTC is produced as well as imported. To control supply of CTC into the market, the following options are available:

- **Production quota for CTC production for non-feedstock applications** for the producers. The share of production quota for each of the CTC producing enterprises will have to be decided by the Association of Chloromethane Manufacturers (ACM). The quotas have to be given for non-feedstock applications and will be subject to the maximum limits, as defined under the Montreal Protocol, for each of the manufacturers. Reporting on quotas should be done on a quarterly basis and should contain data relating to sales to each distributor / dealer to whom the enterprises are selling CTC. While it is easy to administer this system (which is likely to be similar to CFC production quotas in many aspects), there may be issues in developing a system at this stage as a result of uncertainty on the road map that will be followed by CTC producers for phasing out CTC production. Further, industry rationalization issue may also result in restructuring the proposed regulatory systems to cater to needs of the market.

- **Import quotas or permits for CTCs for non-feedstock applications**. Currently, CTC is imported for non-feedstock applications by manufacturers of products that need CTC in production process/operations. These manufacturers are generally large in size and hence, will need to be covered on priority, under MLF funded CTC consumption phaseout projects. Thus, these enterprises will undergo a “onetime shift” to non-ODSs. Administering a quota system for these enterprises will result in issues relating to equity, quantification of exact quotas, timing of shift to alternatives etc. Further, if a ban on imports is imposed, there is likelihood that the market may face price distortions. Therefore, it is imperative that a flexible system be setup to cost effectively meet the requirements under the Protocol.

96. In light of the above, it is recommended that **a hybrid system of production quota and import quota be developed and implemented** in India. The decision on share of import quotas against domestic production quota will be decided by Ministry of Environment and Forests, depending upon availability of CTC in the domestic market, the pricing mechanism and prevailing domestic price against international price, plans of domestic manufacturers etc.

In the beginning of the year, the quota for CTC for non-feedstock use for the country will be determined. The requirement will be broken up into direct imports for CTC for non-feeds stock use and production for non-feedstock use. While the former will be obtained from user industries based on the import requirements specified by them in the beginning of the years, the latter will be determined based on net remaining consumption. If there is expected shortfall between consumption and domestic production, the shortfall will be compensated through import license. This system will be applicable from the year 2005 only and needs

to be aligned with the agreement for CTC production sector phaseout project. This quota system will not be applicable for feedstock uses. ***While this presents a broad framework, the exact details of the quota system will be specified in the production sector phaseout project.***

97. Further, detailed guidelines will be developed for import of CTC for **non-consumption applications** and these guidelines will be followed for managing and reporting imports of CTC by the user industries. These guidelines will be necessary for ensuring that CTC for feedstock use is not diverted for other consumption use.

98. Further, a ban on import of CTC for non-feedstock uses may be aligned with end use industry switching over to alternatives. Under the current situation which necessitates switching of large CTC users to alternatives, a ban on imports from a future date, should be planned for and communicated as this will speed up the process of switch over to ODS alternatives.

99. Consumption sector phaseout is expected to be significantly influenced by the quantum of reduction required as per Montreal Protocol i.e., 85% reduction in CTC production / consumption. While technically 15% of the baseline consumption can remain till 2010, market forces and information networking will influence the consumers who have not switched over before 2005 and this is likely to result in a near 100% switch over within the subsequent two to three years i.e., 2006-2008. Therefore, except for project funding, technical assistance support and existing regulatory interventions, no other specific interventions are proposed in the consumption sector. Further, information exchange, training and demonstration activities especially targeting small and medium enterprises as detailed in the subsequent chapter would provide support for phase out.

7. NON-INVESTMENT ACTIVITIES FOR PHASEOUT OF OD SOLVENTS

7.1 AWARENESS ACTIVITIES

100. There is a significant need for raising awareness regarding Montreal Protocol and phase out of ODS in the solvent sector as this sector has a significant component of informal sector and the quantum of phaseout by 2005 is very high. In a country of the size of India, stakeholders relating to this sector have varying degrees of awareness on Montreal Protocol and its implication. Low awareness regarding OD solvent phase out could impede successful phase out of OD solvents used in India and also result in risk of illegal use of OD solvents. Moreover, the phase out needs to be aligned in a manner that does not unduly harm industrial and economic growth or consumer interests. The above necessitates effective awareness and information exchange programs for this sector.

7.1.1 Objectives of awareness activities

101. The focus of the program relates to increasing awareness on:

- Solvent sector phase out plan and related regulations,
- Non ODS technology options, availability of alternatives and technology transfer for usage of alternatives.
- Participation in phase out activities including training, information exchange etc.

102. Survey reports indicate that most enterprises using OD solvents are not aware of phase out deadlines or assistance available under the Multilateral Fund for phasing out OD solvents and shifting to non-OD alternatives. Further, the consumption of informal enterprises is concentrated in clusters/pockets primarily close to the production centres of CTC. Therefore, awareness mechanisms have to be designed to access these consumption pockets through stakeholders offering services in these pockets.

103. In addition, enterprises also need to be educated on various alternative technology options to OD solvents along with the technical and commercial aspects. There is also a need to educate users to employ good practices for servicing the requirement in the sector.

104. The needs of the solvent sector, which may be addressed through the awareness program supported by training activities are tabulated below:

Table 19 – Key needs of solvent sector

Needs		
Immediate needs (less than a year)	**Short term needs (1-3 years)**	**Long term needs (3-7 years)**
Awareness regarding Montreal Protocol Regulatory and legal aspects Attract participation in phase out activities and adoption of non-OD solvents Effect of CTC on human and environmental health	Regulatory and legal aspects Encourage participation in phase out activities and adoption of non-OD solvents Effect of CTC on human and environmental health	Awareness on non-OD solvents, their availability and adoption. Information on impact of phaseout activities in solvent sector. Effect of CTC on human and environmental health

7.1.2 Use of direct communication channels

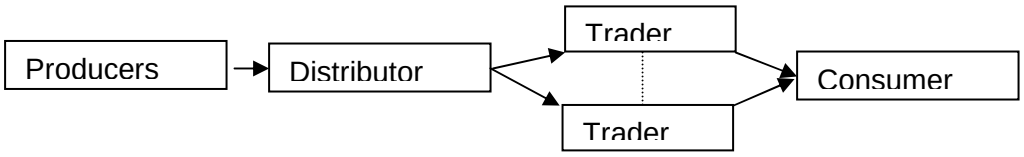
105. Besides media such as print, television, radio, publications, pamphlets etc., access to the consumers in solvent sector can also be developed through mechanisms of direct communication to users in this sector. Knowledge updates pertaining to phaseout requirements, Government interventions, rules and regulation, new technologies etc. should happen through networking with industry representatives and associations.

106. The industry associations for the various sub sectors, such as Confederation of Indian Industries, Textile Association of India, Indian Machinery Tools Manufactures Association, Electronic Components Industry Association, Indian Electronic and Electrical Manufactures Association, All India Plastic Manufactures Association, All India Federation of Plastic Industries, etc. may also play a role in reaching out to their members and support identification of non OD suppliers. The bigger associations, that exist at National level, could provide information to smaller sub sector associations, which may assist to target the smaller enterprises, especially at regional level.

7.1.3 Use of distribution network to support phaseout

107. A schematic representation of the distribution network for solvents is given below.

Figure 3 – Engaging Cleaner Production Centre



108. Use of dealer network presently supplying OD solvent may result in resistance to propagation of non-OD solvent related information. During the survey, high resistance was encountered from present dealers to share information regarding end users of OD solvent. But one has to remember that Ozone Rules, 2000 will eventually result in 85% reduction in availability of ODS to dealers. Therefore, it is likely that the dealers may look for options of selling non-OD alternatives. Therefore, use of dealer network for facilitating to ODS phaseout should primarily relate to help them develop business opportunites for cleaning applications using non-ODS solvents.

109. Dealers can also serve as an important coordinating point in identification of user enterprises in phasing out ODS. Distributors and traders are agents of change for non-ODS technologies and practices. They know the users and understand their needs. They can thus facilitate in transfer of knowledge and information for facilitating conversion to non-ODS technologies. Therefore, it is important to maximise their participation in information exchange and training activities for OD phaseout in solvent sector. This will serve an incentive to them for becoming “early birds” in supplying non-ODS chemicals and give them an environment friendly image. Further, inclusion of dealers in alternative technology information dissemination process will serve as an incentive to them in achieving visibility and their active participation in technology transfer process.

110. The assistance and help of dealers of non-OD alternative chemicals to these industries may be solicited to disseminate information and increase reach. The dealers of non-ODS could play a dual role of not only increasing awareness but also ensuring logistics of supply of alternatives and usage of alternative technology.

7.1.4 Incentives to support early conversion and participation in phaseout

111. For greater participation in ODS phaseout, special schemes can be launched to attract enterprises in participating in ODS phaseout activities. Such schemes will include:

- **Early bird incentive scheme** for solvent consumers who volunteer to convert early. This can be in the form of rewards and recognition to such enterprises.

- **Micro venture capital schemes** for small enterprises who convert from ODS usage as solvents to no clean technologies, through the existing networks wherever applicable.

- **Incentive to distributors** both in the form of recognition and rewards can be provided for their support and involvement in conversion to non-OD alternative technologies.

These schemes can be implemented during the awareness and training activities, which will be implemented as a part of technical assistance activities in solvent sector.

7.1.5 National Awareness Strategy

112. The Ozone Cell, Government of India has already initiated a nation wide Awareness Strategy. The objectives of the Awareness Strategy will include increasing awareness on the Montreal Protocol, increasing awareness regarding ODS and its harmful side effects, ODS rules and regulations, provide inputs to stakeholders so that they can cost effectively manage phase out and educate stakeholders on their role in phasing out ODS.

113. The campaign would provide general awareness regarding usage of OD solvents as well as address the needs of State and regional level bodies. The overall solvent sector awareness program will dovetail into the National Awareness Strategy and the coordination would be through the SPO.

114. The National Awareness Strategy is targeting the public on broader parameters including the harmful effects of ODS and depletion of Ozone Layer and subsequently build awareness and public opinion to purchase non ODS products. But given the short time frame to address the solvent sector phase out concentrated awareness is required targeting the industry on aspects pertaining to the industry. Moreover, focus is also required on provision of alternative technology options, assistance in shifting to non-OD solvent, good practices which is not directly being addressed by the National Awareness Strategy.

7.1.6 Others

115. SATS, as detailed in Section 7.2, are expected to be set-up to ensure support for OD solvent consumers during the phase-out effort both on technical and operational administration. These units will be supported by a network of experts, dealer network and industry representatives. The role of SATSs would include identifying pockets of ODS consumption with support from distribution network, to the extent feasible, increase technology knowledge on use, providing knowledge of alternative technology, providing information on availability and access to non-OD substitutes and monitoring and coordination of activities.

Since the geographical locations of these small units are widely dispersed through the country, the proposed SATSs will have mobile arms to take the information on alternatives to the doorsteps of the small enterprises through road shows. As was evident after the survey, the geographical location of small units, though dispersed, are found in clusters.

116. Based on data provided by the distributors, more than 90% of the sale of ODS is from four states, namely Tamil Nadu, Maharashtra, Gujarat and Delhi. Awareness activities should immediately focus on these supply pockets to ensure faster phaseout.

117. A summary of the main activities which would form part of the Awareness campaign are tabulated below:

Activity	**Starting**	**Coordination**	**Coverage**
Information dissemination in print media to build awareness regarding phase out dates	2003	PMU / SPO	2-3 nation wide announcements
Pamphlets and brochures sensitise phase out, alternative technology options, good practices etc.	2003	SATSs	Throughout the first three years
Technical Workshops for State level technical institutions	2003	SPO and SATSs	Workshops across 16 of States during the first year
Road shows by SATS	2003	SATSs	Major consuming industrial pockets for the first three year
Sensitising corporates who have OD solvent users as intermediaries, enterprises and general public through articles in newspapers.	2003	SPO and industry associations	Throughout the first three years

118. UNEP's information cleaning house assists National Ozone Units and other stakeholders with regard to compliance with the 2005 limits (primarily for CFCs and CTC) and earlier phase out targets. Further, assistance to NOUs in developing countries on preventing growth in consumption of ODSs is also offered through clearing house activities. Given their experience in countries across the globe and rich experience in assisting NOUs in phaseout, UNEP's Clearing House activities can be gainfully used for phaseout related measures especially information exchange and technology transfer, which are critical for ODS phaseout in solvent sector in India.

7.2 DEMONSTRATION ACTIVITIES

119. **Solvent Alternative Technology Services SATS**: The purpose of SATSs is to ensure that there is enough support for OD solvent consumers during the phase-out effort at a regional level on technology information and adoption. Further, there would be immense pressure on small and medium enterprises to cope with the short timeframe for changeover to non OD solvent and regional support would be required to minimise undue harm to these enterprises.

120. Although SATS is designed to assist all users, its primary purpose is to service the small enterprises. SATS consists of the following key elements:

- Nine regional Solvent Alternative Technology Services units housed in State level technical institutions or Industrial Training Centres. These SATSs will carryout the following activities:

  - Knowledge dissemination on non-ODS technology,
  - Technical inputs on usage of these alternative technologies,
  - Mechanisms for adopting non-ODS alternatives, and
  - Monitoring and implementing technology transfer activities.

  The expected locations of the SATS are given in the table below.

State	**Location (including alternatives)**	**Coverage**
Tamil Nadu	Coimbatore	Tamil Nadu, Kerala
Karnataka	Bangalore	Karnataka
Andhra Pradesh	Hyderabad	Andhra Pradesh/Parts of Orissa /Maharashtra
Maharashtra	Pune / Mumbai	Maharashtra / South Karnataka
Gujarat	Ahmedabad/ Baroda	Gujarat / Parts of Madhya Pradesh /
Delhi	Delhi	Haryana, Delhi, Punjab, Himachal Pradesh, Jammu and Kashmir
Uttar Pradesh	Lucknow/ Kanpur	Uttar Pradesh/Uttaranchal/ Parts of Bihar
West Bengal	Calcutta	North Eastern region/ West Bengal/ Jharkhand/ Orissa and other North Easter States
Madhya Pradesh	Bhopal / Gwalior	Madhya Pradesh/Chattisgarh

Note: This list is illustrative and may change depending on needs identified by Government of India. Union Territories attached/geographically close to the State will be covered through the respective States.

- In addition, SATS would be primarily be supported by one or more of the following:

  - Local manufacturers/dealers of non-OD alternatives, and
  - Experts in the field.

121. As mentioned earlier, SATS will be involved in development of a promotion and delivery system to reach many solvent users dispersed geographically in the country. Since the geographical locations of these small units are widely dispersed throughout the country, the proposed ***SATSs will also have mobile arms*** to take the information on non-OD alternatives to the doorsteps of the small enterprises through road demonstrations. As mentioned earlier, the geographic location of small units though dispersed are found in clusters, high consumption concentration clusters would be targeted for these road shows.

122. The mobile units will be well equipped for demonstration purposes on alternative technologies, information brochures relating to non-ODS alternatives, technical information on alternatives and their safe usage etc.

123. These units will be attached to a specific SATS. Thus, for nine SATS, there will be nine mobile units. The technical staff, who will receive training on alternative non-OD technologies, will be travelling in these units for information dissemination and demonstration purposes. These units will coordinate with the local consumption centres through industry associations, dealer network of ODS, industrial development centres etc. for conducting demonstration and training activities.

124. The activities of SATS mobile units will be periodically reported to the Regional Centres, which will in turn report on activity status to the Ozone Cell. The report will include number of training programs conducted in different locations, number of participants, industry structure in the location, response status by the participants, etc.

7.3 TRAINING FOR CAPACITY BUILDING IN SOLVENTS SECTOR

7.3.1 Brief overview of training program

125. Training program is key to facilitate switchover of a large proportion of informal enterprises using OD solvents in their manufacturing/production process. The target group for training program is primarily technical institutions and dealers in non-ODS so that they can help in information dissemination and technology knowledge to end user industry.

126. Given the short time frame required for switchover, the technology transfer road map that is proposed includes mobile arms for technology dissemination. The training program is expected to facilitate access to information for the consumption pockets especially the small-scale user industries.

7.3.2 Training needs

127. The major training needs will include the following:

- Awareness on Montreal Protocol with focus on solvent sector,
- Training on alternative technologies available in the sector,
- Safety and good practices in using alternative technologies, and
- Methodologies for effective training and awareness building.

128. It is also known that the training requirement will vary depending upon the process adopted by enterprises in different sub-sectors. Therefore, there may be some common training modules for all target respondents and differentiated training requirement for alternative technology end use segments.

129. Since training is required for capacity building over long term, this activity can be carried out over a period of next two to three years, commencing immediately. As mentioned earlier, the training activities should immediately focus on the large consumption centres namely, Tamil Nadu, Maharashtra, Gujarat, Delhi, Karnataka, Kerala, Andhra Pradesh, Madhya Pradesh and Kerala.

7.3.3 Assessment of training requirements through existing training institutions

130. Technical training is provided by broadly the following five categories of institutions.

- Engineering Colleges and Technical Polytechnics, both Government owned and private.
- ITI and affiliated private training institutions of the DGET, Government of India (2000 in number).
- SISIs of the DCSSI (about 28 in numbers).
- Private Training Institutes.

- Industries, which are in the business of non-ODS alternatives for solvent sector.

131. Each of the training institutions cater to certain segments of the trainees. While the Engineering Colleges and Polytechnics cater to the higher end of trainees, the other three cater to a large extent to the technicians working with small and informal sector enterprises. DGET plays a leading role in training in designing courses for these institutions and providing training to the trainees. The changes in courses need to be appropriately designed for providing training to outgoing technicians, who are trained by these institutions.

132. Apart from these, SATSs will act as knowledge centres for disseminating information relating to solvent sectors. Key technical personnel from SATSs should also be trained to supplement the training provided to the above institutions.

133. In addition, training program may also cover dealers/ distribution network who are dealing with solvent industry. This will help in improved participation by the distribution network in technology transfer and information dissemination on non-OD solvent to the user industry.

7.3.4 Key principles of the training plan

134. The focus of the training program is on building capacity of local technical institutions on alternative technologies to end user segments that are currently consuming CTC. The following will be underlying principles for training plan for the solvent sector.

- Training should have an immediate focus on awareness building on ODS phaseout, processes and non-ODS alternatives for specific subsectors.

- Training should be designed in such a way that key personnel from large volume consumption centres are trained as trainers so that they can carryout training in their respective areas.

- For cost effectiveness, training should use local facilities to the extent possible. Training at SATSs should be used only for the local participants and trainers, who will disseminate the information to the large informal sector.

- Given the short time frame to phasing out CTC in solvent sector, focus will be more on awareness and building accessible networks, and not on comprehensive training of informal sector.

7.3.5 Implementation of training plan

135. Given the consumption pattern and nature of industrial activities, it is proposed to train personnel from 23 States and Union Territories. The total number of trainees proposed to be trained is estimated to be 550. As mentioned earlier in Section 7.2 and Section 7.5.2, the training activities will be phased in such a way that the large consumption pockets will be addressed in the initially

and the other small consumption pockets will be addressed at a later date. This will ensure higher information exchange in vulnerable pockets and encourage them to phaseout ODS solvents.

136. The training program will be a **three day program** which will primarily include:

- General awareness on Montreal Protocol
- Consumption of ODS in solvent sector
- Alternative technologies for conversion for solvent sector
- Methodology of use and conversion to alternative technologies
- Training techniques and methodologies for conducting downstream programs.

137. This training program will include normal class room session and "hand holding" demonstration sessions, to the extent feasible. Visual aid will be used for these training programs for effective communication on alternative technologies.

138. The above mentioned activities should be done in coordination with local technical institutions, local industry associations, dealers of non-ODS and Small Industries Services Institutes (SISIs) in the State. Participation from industries, which have already adopted alternatives, should be encouraged to demonstrate implementation effectiveness.

7.4 TRAINING SUPPORT AT INDUSTRIAL ESTATES AND PARKS

139. The State Governments in India have established a large number of industrial estates and parks to facilitate industrial growth and employment. These parks are available close to cities and large towns and play a key role in promoting industrial growth.

140. The industrial estates are promoted and managed by industrial estate management offices, which act as nodal points for information dissemination and support to the industries in the respective estates. They are geographically closer to their associated industrial estate and thus understand the needs of these estates.

141. From the above, one can see that these centres can play a key role in information dissemination and knowledge transfer for technology change i.e., conversion of enterprises consuming ODS in these centres to non-ODS technologies. This can be done in close coordination with Cleaner Production Centres / National Productivity Council, wherever these are active.

142. Training can be provided to the industrial estate managers on alternative technologies. For providing this training, existing management guides developed for training by UNEP DTIE can be utilised wherever required.

7.5 OTHER SUPPORT ACTIVITIES

7.5.1 MIS Development

143. Design and development of the Solvent Sector Management Information System is critical for monitoring implementation of activities in the sector.

144. MIS will be developed to track progress of the Annual Programs and overall phase out, including OD solvent project status and technical assistance activities. The MIS will be designed to allow SPO to use it as the main tool for project monitoring and disbursements, performance audits of the CTC producing enterprises, generating progress reports and impact analysis. Once established, the MIS design will evolve and be revised as needed, based on project implementation experiences and evolving needs for reporting.

145. Ideally the MIS should provide a network between the various stakeholders, the Government of India, Ozone Cell, SPO, Regional Centres, implementing agencies, beneficiaries and industry associations.

146. The MIS will contain information on the following aspects of the project:

- Overall project indicators at the national level, including the base-line OD solvent consumption levels, the national phase-out schedule agreed under the project and annual national phase-out targets.

- TA activities, including descriptions of each activity, TORs for consultants, budget and time estimates, implementation progress and outputs including information on set up of training centres, no clean technology, non OD alternatives etc.

- Status of implementation of awareness programs and training programs.

- Promulgation, implementation status, and effectiveness of other relevant policies and regulations, including the ODS (Regulation) Rules, and development of any new policies and regulations relevant to the project, and

- Financial information for the TA component, and for the enterprise compensation component, including the date and amount of disbursements to each grant beneficiaries.

7.5.2 Other innovative financing schemes

147. For SMEs, low cost lending for those who are willing to convert on their own, venture capital for those who have innovative solutions like no-clean technologies, zero interest financing scheme for the early transition (to show early success to other enterprises) can be used. Enterprise to enterprise cooperation should be actively encouraged and pursued as this can yield convincing results for other enterprises using OD solvents – “learning by seeing”

principle. This will help in hastening the process of conversion and facilitating such conversion process. Other incentive schemes such as incentives for early conversion may be considered for facilitating phaseout.

7.6 DEVELOPMENT OF A NON OD SOLVENT MANAGEMENT PLAN

148. The phase out of OD solvent consumption and conversion requirement to non OD solvent will increase the demand for the latter. There would be a need to identify the requirement for non OD solvents for its application in different end use sectors and ensuring availability of these alternatives. While some alternatives will be already produced by the domestic industry in the country, the other alternatives may need to be imported. Awareness activities should focus on making additional information available on technology and availability of non-OD solvents and their applications.

149. Development and investment in local production of non-OD solvents to meet some of the domestic demand as well as export demand can also be considered. Industry must be encouraged through bilateral dialogues and specific incentive mechanisms for development capacities and ensuring easy availability of non-OD solvents.

150. Formulation of standards and technical norms is important whenever a new technology is introduced. Technical Committees under the Ozone Secretariat do prescribe standards and technical norms for usage of alternative chemicals and technologies in the solvent sector. This will be used as a base line information for non-OD solvent. Local standards need to be developed and approved for usage, wherever necessary.

8. BUDGETARY ESTIMATES

8.1 BUDGETARY ESTIMATES FOR PROJECT ACTIVITIES

151. This section includes estimates of fund requirement for phasing out consumption in solvent sector.

CFC-113

152. A project for phasing out 16 ODP tons CFC-113 from Bharat Electronics Limited (BEL) for US $ 170,959 is being submitted for approval. Apart from this, no additional project is envisaged for funding for CFC-113 in solvent sector.

CTC

153. As mentioned earlier, CTC, which constitutes major portion of solvent consumption, is also consumed as process agent. Projects for consumption of CTC as a process agent are separately addressed in the Process Agent Sector strategy. A separate strategy and a project for funding is being prepared for phasing out CTC from production sector.

154. Therefore, in this section, funding requirement for phasing out CTC from consumption sector is only presented.

155. Solvent sector consumption primarily includes consumption in textile cleaning applications and other metal cleaning applications. Of the total consumption in solvent sector of 3,614 MT, the textile cleaning and metal cleaning applications are estimated to consume 1,022 MT and 2,592 MT, respectively.

156. Funds have already been approved for five CTC solvent projects in metal cleaning applications. These projects are currently under implementation. The total amount of funds approved and ODP phased out for these projects aggregate to USD 1.46 million and 117.9 ODP tons, respectively. These projects are scheduled to complete in 2004.

157. In addition to this, the following projects have been identified for funding.

Name of the Company	ODP MT phased out	Funds requested in USD
Nissan Copper Private Limited	99.0	986,177
Western Engineering Limited	38.5	510,724
Steel Authority of India Limited	295.0	3,789,924
Hind Metals and Tubes	52.8	461,480
Total	**485.3**	**5,748,305**

158. The following table summarises the estimated consumption for funding in solvent sector.

Particulars	**Particulars**
Total consumption in solvent application (A)	2,114 MT
Estimated component of large consumption enterprises (B) (estimated as 60% of A)	1,268 MT
Less: Consumption in funded projects (C)	108 MT
Less: Consumption in identified projects (D)	448 MT
Net consumption (E = B – C – D)	712 MT
Cost effectiveness factor of already approved projects (F)	US $ 12 / ODP kg
Total cost of ODP phaseout (G = F * E)	**US $ 8.54 million**

As detailed consumption data by industry is not available for solvent consumption, best estimated consumption in the large enterprises is used for estimating consumption that is likely to be eligible for funding support.

TCA

Baseline consumption of TCA in India is 283 ODP tons. Enterprises consuming TCA have not been identified in the survey findings. The estimation of cost of conversion can be done only after identification of enterprises and assessing technology transfer costs.

Most of the approved projects have a cost effectiveness threshold in the range of US $ 20 to US $ 35 per kg ODP. The average cost effectiveness of TCA projects approved for India is estimated at US $ 25.6 per kg ODP. Based on the average cost effectiveness of projects approved in India, the maximum funding that may be available to India for phasingout TCA consumption is US $ 7.3 million. ***This estimate needs to be confirmed only after identification of enterprises using TCA and preparation of conversion projects for these enterprises***.

As mentioned earlier, the technical assistance component of SPO will need to provide support facilitate phaseout of TCA. First and foremost activity will be to identify enterprises, which are consuming TCA in the country. While the large consuming enterprises will be assisted through project funding mechanism, the small enterprises will be supported through TA component of the solvent sector.

8.2 BUDGETARY ESTIMATES FOR NON INVESTMENT ACTIVITIES

The budget estimates for the proposed activities relating to capacity building and institutional strengthening is given below. Over and above this, Government of India will provide support through management time, sharing of resources etc. for ensuring successful implementation of this project.

Particulars	USD
Staff for project	456,250
Running cost	375,000
One time start up cost	50,000
Sub total	**881,250**
Performance audits for sales for consumption	145,833
Awareness building	416,667
Training for capacity building of technical institutions	91,906
Solvent Alternative Technology Services including mobile units	1,085,625
MIS development	31,250
Research and studies	125,000
Contingencies	94,814
Sub total	**1,991,095**
Total	**2,872,345**

Note: The above numbers are calculated for a period of seven years. Some of the costs will be incurred for a shorter duration of time.

Yearwise expected requirement of funds for the above activities is given in the table below.

(All figures in US $)

Year	Investment	TA comp.	Total
Year - 1	2,135,000	1,585,094	3,720,094
Year - 2	2,135,000	362,376	2,497,376
Year - 3	1,067,500	362,376	1,429,876
Year - 4	1,067,500	140,625	1,208,125
Year - 5	1,067,500	140,625	1,208,125
Year - 6	1,067,500	140,625	1,208,125
year - 7	-	140,625	140,625
Total	**8,540,000**	**2,872,345**	**11,412,345**

Overall project implementation plan is given in the table below.

Key activities	2003-05	2006-2010	2011-15
PROJECT IMPLEMENTATION			
Project Identification and implementation			
TECHNICAL ASSISTANCE AND SUPPORT			
Establishment and operations of SPO			
Regulations - Quota System/Supply Controls			
Awareness building			
Technology transfer and information dissemination			
Training of users / stakeholders			
Monitoring			

Note: Activities marked in grey are high intensity activities and activities shaded in square patterns are low intensity activities.

8.3 IMPACT ON ODS TONNES PHASED OUT

159. Awareness and training activities alone would not lead to phase out of OD solvents, unless accompanied by conversion to no clean or alternative non-OD technologies. Therefore, better awareness and training should ensure evaluation of non OD solvents as well as gradual acceptance at good and clean practices. The impact and magnitude of conversion would be difficult to estimate at this stage.

160. Supply situation assessment and management for adoption of non-ODS technologies is important. This will ensure transition at minimum cost to the industry and consumer. Past experience in similar transitions in India indicate that good amount of persuasive effort with periodic and systematic awareness building and supply management of alternatives are necessary to ensure smooth phaseout.

Annexure 1

LIST OF IDENTIFIED ENTERPRISES CONSUMING CTC IN SOLVENT SECTOR WHERE CONSUMPTION IS KNOWN

Sl. No.	Name	ODS	Consn. in 2001 (MT)
1	Novex	CTC	0.00
2	PLA Components	CTC	0.25
3	Triveni Engg Industries	CTC	0.00
4	Larsen and Toubro	CTC	0.32
5	Dinakaran	CTC	4.50
6	Carton Makers	CTC	0.00
7	Punjab Kesri	CTC	0.19
8	The Hindu	CTC	0.09
9	RK Graphics	CTC	0.38
10	Jaya Printers	CTC	0.10
11	Sai Sri Ram Printers	CTC	0.12
12	Rama Vision	CTC	0.06
13	Guru Hargobind Thermal Power Plant	CTC	24.00
14	WBPDCL, Kolaghat Power Station	CTC	0.05
15	HMT International	CTC	0.00
16	Orrjay Process	CTC	0.19
17	Sree Balaji Offset Printers	CTC	0.06
18	Jothi Color Scan	CTC	0.02
19	Universal Print System	CTC	0.06
20	South India Gravures	CTC	0.00
21	SAIL Durgapur	CTC	4.35
22	IISCO Burnpur	CTC	0.55
23	Hindustan Syringes	CTC	0.12
24	Centwin Garments	CTC	4.80
25	Premier Mills	CTC	3.98
26	Samabamdam Siva Mills	CTC	1.44
27	Vardhaman	CTC	18.00
28	Ruby Mills	CTC	0.95
29	Multimetal Ltd	CTC	0.38
30	Hindustan Refrigeration	CTC	0.50
31	Atlas Wires Limited	CTC	4.80
32	Precision Wires India Limited	CTC	4.20
33	Bharat Insulation Company	CTC	0.30
34	Century Enka Limited	CTC	0.80
35	Indian Petrochemicals Corporation Limited	CTC	4.90
36	Crystal India Limited	CTC	12.03

Sl. No.	Name	ODS	Consn. in 2001 (MT)
37	Steel Authority of India Limited	CTC	268.00
38	North India Wire Limited	CTC	5.16
39	Military Engineering Services Limited	CTC	4.00
40	Best Heattreatment Services	CTC	4.80
41	Hindustan Aeronautics Limited	CTC	2.00
42	Omega Refrigerant	CTC	5.00
43	Ahmedabad Electricity Board	CTC	0.10
44	Blue Star Limited	CTC	6.00
45	Navdeep Engineering	CTC	49.00
46	Space Application Center	CTC	0.50
47	BHEL Hyderabad	CTC	0.24
48	Sapna Coils	CTC	20.69
49	Sapna Engineering	CTC	13.15
50	Engineers Industries	CTC	18.33
51	Hind Metal and tubes	CTC	48.00
52	Nissan Copper Private Limited	CTC	90.00
53	Western Engineering Company	CTC	35.00
54	Kores India Limited	CTC	0.00
55	Raghu Overseas	CTC	0.50
56	Gratech Fasion	CTC	0.45
57	Pan Paras Garments	CTC	0.40
58	Chamundi Textiles	CTC	NA
59	Mysore Udhyog	CTC	NA
60	Meenakshi Textiles	CTC	1.20
61	Makara Chemicals Tech.	CTC	2.00
62	GTN Textiles	CTC	0.30
63	Sri Nachhammai Cotton Textiles	CTC	3.00
64	SCM Textile processing	CTC	5.00
65	Cheran Processing	CTC	10.00
66	Rana Textile Processing	CTC	10.00
67	Rajalaxmi textiles	CTC	NA
68	Bhawani Textile Processing	CTC	NA
69	Exin Knits Private Limited	CTC	0.50
70	Signal Hosieries	CTC	0.30
71	Kamaleshi Dyeing	CTC	5.00
72	Amman Dyeing	CTC	5.00
73	Maruthi Processing	CTC	5.00
74	Rajagopal Textiles	CTC	0.12
75	Maharaja Shree Umaid Mills Limited	CTC	NA
76	Tata Steel	CTC	56
77	Bhushan Steels	CTC	28
78	Jindal Steel	CTC	20
79	Ispat Industries	CTC	10

Sl. No.	Name	ODS	Consn. in 2001 (MT)
80	Steelco Gujrat	CTC	5
81	E.B.G Industries Limited	CTC	5
82	Ruchi Strips	CTC	7.2
83	Tube Investment	CTC	4
84	Hero Strips	CTC	4
85	Pennar Strips	CTC	2.4
86	Asil Steel	CTC	2
87	Avery Strips	CTC	2.4
88	Surya Roshini Limited	CTC	2.8
89	Uttam Steel	CTC	7.2
90	Lloyd Steel	CTC	4.8
	Total		**872.3**

Note: The list contains list of identified industries and is not exhaustive. The list of companies marked in grey already have projects for ODS either approved or pending approval.

Annexure 2

LIST OF IDENTIFIED ENTERPRISES CONSUMING CTC IN SOLVENT SECTOR WHERE CONSUMPTION IS NOT KNOWN

S.No.	Name of the company	Location
1	Dabur India Limited	Gaziabad
2	Phoenix Fine Chemicals Private Limited	Sohna
3	Stella Industries Private Limited	Gurgaon
4	Ruby Aerosol	Delhi
5	Bakshi Aerosol	Delhi
6	Texas Industries	Delhi
7	Delhi Transport Corporation	Delhi
8	Indian Railways	
9	Deepak Aerosol Limited	Delhi
10	OKS Speciality Lubricants India Private Limited	Bangalore
11	Aerosol Formulation	Delhi
12	Aerofil	Delhi
13	Polyspin Aerosol	Delhi
14	Agni Rakshak systems	Hyderabad
15	Alert Fire services	Secundrabad
16	Allied Agencies	Secundrabad
17	Consys electronics	Hyderabad
18	Eva Dutt Automatic system	Hyderabad
19	Express Safety Engineers	Hyderabad
20	Fire and safety equipment	Hyderabad
21	Hindustan Engineers corporation	Hyderabad
22	Kenson Commercial Corporation	Vijaywada
23	Minnerva Marketing Corporation	Hyderabad
24	Murthy Cine Industries	Vijaywada
25	New Fire Engineers (P) Limited	Secundrabad
26	Pro-fire safety Engg	Hyderabad
27	Real Value	Secundrabad
28	Reliance Fire and safety	Secundrabad
29	Sathvika Fire Services	Secundrabad
30	Speedage Industries	Secundrabad
31	Sri Sarada Enterprises	Vijaywada
32	Sri Vinayaka Agencies	Hyderabad
33	Suri Industries Engg Co.	Hyderabad

S.No.	Name of the company	Location
34	Universal Fire Engineers	Secundrabad
35	Usha Fire Safety Equipment	Secundrabad
36	Everest Fire Protection	Delhi
37	Electroquip	Delhi
38	Everite Fire Engineers	Delhi
39	Excel	Delhi
40	Fire Age IndL appliances	Delhi
41	Fire equipment Engineers	Delhi
42	Fire hut	Delhi
43	Fire King Engineering Co.	Delhi
44	Fire Out Engineers	Delhi
45	Fire Suit	Delhi
46	Furex	Delhi
47	Fyre safe	Delhi
48	Fyrepotek	Delhi
49	Good Fire	Delhi
50	Great Sales	Delhi
51	HD Protect	Delhi
52	India Gypsum	Delhi
53	Industrial Products	Delhi
54	Jagruck International	Delhi
55	Jawala safety	Delhi
56	Modern Industries	Delhi
57	R.K.industrial Appliances	Delhi
58	Raghubir Services	Delhi
59	S.K.Jain Rubbers	Delhi
60	Shakti Metal Industries	Delhi
61	Shakti Products	Delhi
62	Steelage Industries Limited	Delhi
63	Super Firel Private Limted	Delhi
64	TCS High Tech Engineers	Delhi
65	VDs Induatries	Delhi
66	Vikram rubbers	Delhi
67	Vinod Sales Corp.	Delhi
68	A.V. Agnishikar & Co.	Goa
69	Fyregard Enterprises	Goa
70	A One Engg	Ahmedabad
71	Abdul Samad Abdul Kadar & Sons	Ahmedabad
72	R. K. Enterprises	Gurgaon
73	Walbros Electricals	Faridabad
74	Enercom Electronics	Faridabad
75	National Handicapped Fina	Faridabad
76	National Hydro Electric Power corporation	Faridabad
77	Aarege Industries	Bangalore
78	Arya Comm & Electronics sys (P) Limited	Bangalore

S.No.	Name of the company	Location
79	Chertech India Limited	Bangalore
80	Elegent Machine works	Bangalore
81	Everex	Bangalore
82	Brijal Dhody & Sons	Gwalior
83	Modern Safety devices	Raigad
84	Sharma & Associates	Gwalior
85	Vishwarshan	Gwalior
86	Gill sons market Corp	Ludhiana
87	Gupta Traders & Co.	Patiala
88	Karwin enterprises	Chandigarh
89	Raja Traders	Ludhiana
90	S S International	Ludhiana
91	Abhi Engineering Co.	Coimbatore
92	Air Foam Industries (P) Ltd	Anna Nagar
93	Asiatic Enterprises	Chennai
94	Balaji Agencies	Coimbatore
95	Hindustan Trading Corp.	Coimbatore

Annexure 3

LIST OF IDENTIFIED ENTERPRISES IN TEXTILE INDUSTRY CONSUMING CTC

S.No.	Name of the company	Location
1	Batra World Wide	New Delhi
2	Dhruv Globals Limited	Faridabad
3	Mechtech Knitfab Private Limited	Gurgaon
4	Bhola Hoisery Factory	Ludhiana
5	Dewan knit	Ludhiana
6	Jain Udhay Fabric Ltd.	Ludhiana
7	Bhandari Exports Ind Ltd.	Ludhiana
8	Nagesh Knitwears Ltd.	Ludhiana
9	Duke FabricsPvt. Ltd.	Ludhiana
10	Eakata Dyeing	Ludhiana
11	Neetee Clothing (P) Ltd.	Gurgaon
12	Orient Craft Ltd.	Gurgaon
13	SPZ Overseas	Faridabad
14	TCNs Ltd.	Noida
15	Modelama Export house	Gurgaon
16	Parth Fashions Pvt. Ltd	Gurgaon
17	Tilak Export	New Delhi
18	Fomost India Export	New Delhi
19	Toy N Toy Internationsl	Sonepath
20	Texport Fashoins	Gurgaon
21	Eagle Fashions	Delhi
22	Henstich India	Noida
23	Anand Int (India)	New Delhi
24	Dynamic India (P) Ltd	New Delhi
25	Mezzo Clothing (P) Ltd	Noida
26	Knit & Fit Export	Noida
27	Vam Organics	Noida
28	Gopal Clothing (P) Ltd	Gurgaon
29	Omega Export	New Delhi
30	Exotique Export	New Delhi
31	Gokal Das India	Bangalore
32	Gokal Das Intimate wear	Bangalore
33	Gokal Das Weil (P) Ltd	Bangalore
34	Dhir Inter (P) Limited	Gurgaon
35	Puja Overseas	Ludhiana
36	East West Connections	New Delhi
37	Eagle Fashions	New Delhi
38	Dynamics Fashions (P) Ltd	Gurgaon

S.No.	Name of the company	Location
39	S G Gernlex	Jaipur
40	Meenakshi Textile	Madurai
41	GTN Textile	Alua
42	Rashu Overseas	Chennai
43	Gratech Fashions	Chennai
44	Pan Paras Garnments	Chennai
45	Chamundi Textile	Bangalore
46	Mysore Udyog	Bangalore
47	Sri Nacchammai Cotton Textile	Salem
48	Samabandan Siva Mills	Salem
49	SCM Textile Proceesing	Erode
50	Cheran Processing	Erode
51	Rana Textile Processing	Erode
52	Raj Laxmi Textile	Erode
53	Bhawani Textile processing	Chennai
54	Exim Knits Private Limited	Chennai
55	Signal Hosieries	Chennai
56	Kamalesh Dyeing	Erode
57	Amman Dyeing	Erode
58	Maruti Processing	Erode
59	Rajgopal textile	Trichur
60	Maharaja Shree Umaid Mills Limited	Mumbai
61	Aradhana Industries P Limited	Surat
62	Ambaji Dyeing & Printing	Surat
63	Annapurna Industrries P Limited	Surat
64	Balkishan Dyeing & printing	Surat
65	Gupta Dyeing & printing	Surat
66	Nemsons silk mills	Surat
67	Phalguni Silk mills	Surat
68	Rameshwari Prints P Limited	Surat
69	S R Silk mills	Surat
70	Shreenathjji Industries	Surat
71	Shri Rani Satti processors	Surat
72	Welknown silk mills P Limited	Surat
73	Amar Projects Private Limited	Surat
74	Anjani Dyeing & printing mills	Surat
75	Raghunath silk mills	Surat
76	shree Tex processors P Limited	Surat
77	Vinayak Fabrics Limited	Surat